Environment
Canada

Environnement
Canada

Environmental
Conservation
Service

Service de la
Conservation
de L'environnement

# NATIONAL WATER RESEARCH INSTITUTE

## DIRECTORY OF STUDY PLANS
## 1985-86

INLAND WATERS DIRECTORATE

# NATIONAL WATER RESEARCH INSTITUTE
# DIRECTORY OF STUDY PLANS

## 1985 - 1986

NATIONAL WATER RESEARCH INSTITUTE
CANADA CENTRE FOR INLAND WATERS
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JUNE 1985

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# INTRODUCTION

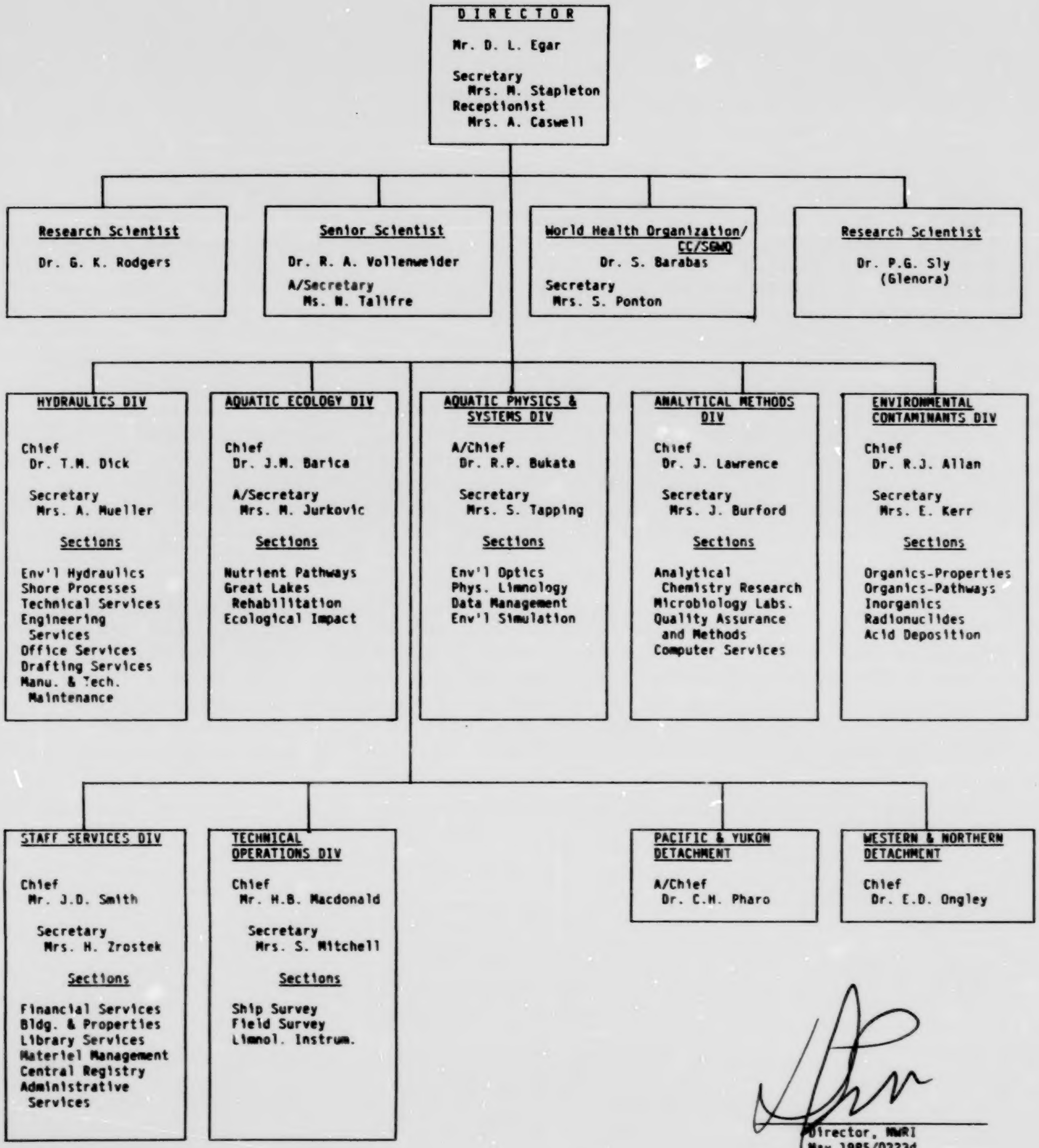
In previous years, the NWRI Study Plan book presented the studies by organizational unit, namely, by each Division. This year, the same organization of study plans is preceded by a new section of the book which lists the studies by issue or problem area. This introductory section allows the reader to immediately see the overall effort, both the direct and indirect, focused on the issue or problem. The details of the individual studies can then be referred to by finding the study sheet.

One important feature of this two-part organization is to demonstrate the multiple applications of many of NWRI's individual projects. For example, a project relevant to the "Toxics" issue may be relevant to the "Great Lakes" issue, the "Pesticides" issue, and the "LRTAP" issue. Another project of an entirely different nature may be relevant to the "Flood Damage" issue, the "North" and the "Dams and Diversions" issues. The fact that many of the projects are applicable to several issues simply adds to their value as research activities. This does not of course imply that projects applicable to a single issue are necessarily less valuable.

The reader will note that there are certain projects marked by an asterisk as "indirectly" relevant to an issue. These are projects which, if read in isolation, may not appear relevant to the issue. However, they are often of critical importance, especially to site-specific problems. An example is the study to predict resuspension of sediment in Lake St. Clair. Such results are critical to a long-term assessment of the recovery of Lake St. Clair from contamination by toxic chemicals introduced from the St. Clair River.

David L. Egar
Director

# NATIONAL WATER RESEARCH INSTITUTE



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**Research Scientist**

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(Glenora)

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Secretary
Mrs. A. Mueller

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- Env'l Hydraulics
- Shore Processes
- Technical Services
- Engineering Services
- Office Services
- Drafting Services
- Manu. & Tech. Maintenance

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Chief
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**Sections**

- Nutrient Pathways
- Great Lakes Rehabilitation
- Ecological Impact

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Secretary
Mrs. S. Tapping

**Sections**

- Env'l Optics
- Phys. Limnology
- Data Management
- Env'l Simulation

**ANALYTICAL METHODS DIV**

Chief
Dr. J. Lawrence

Secretary
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**Sections**

- Analytical Chemistry Research
- Microbiology Labs.
- Quality Assurance and Methods
- Computer Services

**ENVIRONMENTAL CONTAMINANTS DIV**

Chief
Dr. R.J. Allan

Secretary
Mrs. E. Kerr

**Sections**

- Organics-Properties
- Organics-Pathways
- Inorganics
- Radionuclides
- Acid Deposition

**STAFF SERVICES DIV**

Chief
Mr. J.D. Smith

Secretary
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**Sections**

- Financial Services
- Bldg. & Properties
- Library Services
- Materiel Management
- Central Registry
- Administrative Services

**TECHNICAL OPERATIONS DIV**

Chief
Mr. H.B. Macdonald

Secretary
Mrs. S. Mitchell

**Sections**

- Ship Survey
- Field Survey
- Limnol. Instrum.

**PACIFIC & YUKON DETACHMENT**

A/Chief
Dr. C.H. Pharo

**WESTERN & NORTHERN DETACHMENT**

Chief
Dr. E.D. Ongley

Director, NWRI
May 1985/0323d

## KEY TO DIVISIONS AND SECTIONS

FIRST DIGIT OF
STUDY NO.

1-- DIRECTOR'S OFFICE (NWRI)

| | |
|---|---|
| BRANCH | |
| RESRCH | Research & Liaison |
| WHO/CC | World Health Organization/Collaborating Centre |
| PY/RGN | Pacific & Yukon Region |
| WN/RGN | Western & Northern Region |

2-- ENVIRONMENTAL CONTAMINANTS DIVISION (ECD)

| | |
|---|---|
| ECDDIV | Environmental Contaminants Division |
| OPROPS | Organics Properties |
| OPATHS | Organics Pathways |
| INORGS | Inorganics |
| RANUCS | Radionuclides |
| ACDEPS | Acid Deposition |

3-- HYDRAULICS DIVISION (HD)

| | |
|---|---|
| HDDIV | Hydraulics Division |
| OFSRVS | Office Services |
| TCSRVS | Technical Services |
| ENSRVS | Engineering Services |
| EHS | Environmental Hydraulics |
| SHORES | Shore Processes |
| MANTEC | Manufacturing and Technical Development |
| DRFTG | Drafting & Illustration |

4-- AQUATIC ECOLOGY DIVISION (AED)

| | |
|---|---|
| AEDDIV | Aquatic Ecology Division |
| EMPACS | Ecological Impacts |
| GLRLHS | Great Lakes |
| NUPROS | Nutrient Pathways |

5-- AQUATIC PHYSICS AND SYSTEMS DIVISION (APSD)

| | |
|---|---|
| APSDIV | Aquatic Physics & Systems Division |
| ENVSIM | Environmental Simulation |
| PHYLIM | Physical Limnology |
| ENVOPT | Environmental Spectro Optics |
| DATA M | Data Management |

6-- ANALYTICAL METHODS DIVISION (AMD)

| | |
|---|---|
| AMDDIV | Analytical Methods Division |
| ACRS | Analytical Chemistry Research |
| MLS | Microbiology Laboratories |
| QAMS | Quality Assurance and Methods |
| CSS | Computer Services |

8-- TECHNICAL OPERATIONS DIVISION (TOD)

| | |
|---|---|
| TODDIV | Technical Operations Division |
| FIELD | Field Survey |
| SHIP/S | Ship Survey |
| LIM/IN | Limnological Instrumentation |

9-- STAFF SERVICES DIVISION (SSD)

| | |
|---|---|
| SSDDIV | Staff Services Division |
| MATRL | Materiel Management |
| CR | Central Registry |
| FINS | Finance |
| B/PROS | Building & Properties |
| LIBRAS | Library Services |

## 1985/86 NWRI Program Activity Elements

| ECS Program | PAE Code | Activity Element |
|---|---|---|
| 1.1 Canada-U.S. and Interjurisdictional Water Management | | |
| | 1113 | National Water Research Institute and Regional Involvements in Canada-U.S. and Interjurisdictional Water Management |
| | 1170 | International Relations |
| 1.3 Water Quality Management Data | | |
| | 1312 | National Standards Laboratories at NWRI |
| 1.4 Water Quantity Management Data | | |
| | 1430 | Calibration of Hydrometric Equipment (NWRI) |
| 1.5 Water Management Research | | |
| | 1511 | Environmental Contaminants (NWRI) |
| | 1512 | Aquatic Physics and Systems (NWRI) |
| | 1513 | Hydraulics (NWRI) |
| | 1514 | Aquatic Ecology (NWRI) |
| | 1515 | Analytical Methods (NWRI) |
| | 1516 | Centralized Support Services for Water Management Research (NWRI) |
| | 1532 | Water Research: General |
| 1.6 Management and Administration | | |
| | 1611 | Regional/HQ/Institute Management |
| | 1620 | Program Planning, Evaluation, Policy and Advice |
| | 1630 | Financial Support Service |
| | 1631 | Administrative Support Service |
| | 1650 | Physical Plant |
| | 1660 | Library Services |
| | 1670 | Other Support Services |
| 4.1 Toxic Chemicals | | |
| | 4100 | Toxic Chemicals |
| 4.2 Long Range Transport of Airborne Pollutants | | |
| | 4200 | Long Range Transport of Airborne Pollutants |
| 4.3 Environmental Assessment & Baseline Studies | | |
| | 4300 | Environmental Assessment & Baseline Studies |

## Key to Funding Source

| | |
|---|---|
| APWA | American Public Works Association |
| CCP | Canadian Climate Program |
| CWA | Canada Water Act |
| DFO | Department of Fisheries and Oceans |
| ENV2K | Environment 2000 |
| EPS | Environmental Protection Service |
| FIP | Federal Internship Program (formerly COSEP) |
| FPB | Facilities Planning Branch |
| GLWQA | Great Lakes Water Quality Agreement (Canada-U.S.) |
| IWD | Inland Waters Directorate |
| LRTAP | Long Range Transport of Airborne Pollutants 1984/85 |
| MTC | Ministry of Transportation & Communication |
| NH&W | National Health and Welfare |
| NWRI | National Water Research Institute |
| PARKS | Parks Canada |
| PERD | Panel on Energy Research and Development |
| PPWB | Prairie Provinces Water Board |
| SCH | Small Craft Harbours |
| TCMP | Toxic Chemicals Management Program |
| UNESCO | United Nations Education, Science & Cultural Organization |
| WHO | World Health Organization |
| WQB | Water Quality Branch, Inland Waters Directorate |

## Key to Operational Contacts & Interest/Direct - General

The purpose of the Research Communication Strategy is to:

- foster beneficial communication between IWD research and operational communities,
- identify operational research issues and needs consistent with departmental priorities, and
- ensure that as many as possible of these research issues and needs are addressed by the Institutes.

The elements comprising the strategy are as follows:

1. IWD Regions and Headquarters Branches will provide the Reasearch Institutes descriptions of new problems and research ideas relevant to their operational programs. The HQ Directors will also send their overview perspective to the Institutes. These will provide a basis for discussion during the research review meetings and for the development of Research Study Proposals.

2. An annual research review visit will be made by a Research Institute team to each region.

3. Institute Directors will then assemble Research Study Proposals prepared by the researchers for the subsequent fiscal year. The input for the preparation of these will include, but not be limited to, the research needs identified by the Regions and the results of the research review visits.

4. The Research Institutes will send copies of their Research Study Proposals to the Regions and HQ Branches for the following action:

Operational Directors will ask their staff to classify the studies as follows:

i) Direct Interest - In the opinion of operational staff there is a high probability that the results of these studies will be useful within an operational program.

ii) General Interest - Included in this category are studies considered generally relevant to operational programs but for which there is enough uncertainty regarding the possible application of the results that investment of operational staff time is not warranted.

5. When a research study has been identified as "Direct Interest" by a Branch or Region, the Director concerned will designate a staff member to act as Operational Contact for this research. If the study is approved as part of the research program for initiation (or continuation) the following fiscal year, the Operational Contact will communicate with the researcher and discuss the relevance of the research study to the Branch/Regional program, learn enough about the research study to explain it to his operational colleagues, and follow progress of the research, by periodic consultation with the researcher as appropriate until useful results are achieved. The Operational Contact should provide a one page report to his Director, with a copy to the relevant Institute, describing progress to date and the practical applicability of the results. These will assist the researchers and Institutes in preparing proposals for on-going research studies for the subsequent fiscal year and provide management with a critique of the practical application of the research.

6. If a Research Study is identified as being of "Direct Interest" to more than one Region or Branch, the corresponding Research Institute

Director will, on consultation with the relevant Branch/Regional Directors, name a lead operational contact who will be responsible to keep the other interested Branches and/or Regions fully informed.

7. The names of the operational contacts are published with the associated research studies in the Directory of Study Plans. Most studies had several operational people expressing their interest in a study but only the lead operational contacts are shown here.

## Key to Operational Branches and Regions of IWD

RCPE - Research Coordination and Program Evaluation Branch (HQ)
WQB - Water Quality Branch (HQ)
WP&M - Water Planning and Management Branch (HQ)
WRB - Water Resources Branch (HQ)
HQ - Headquarters
NWQL - National Water Quality Laboratory (Burlington)
P&YR - Pacific and Yukon Region
W&NR - Western and Northern Region
OR - Ontario Region
QR - Quebec Region
AR - Atlantic Region

N/A - Not applicable because it is not a research study and was not sent out to Operational Branches
Late - was not available at the time of mailing to Operational Branches

# INDEXES

# KEYWORD INDEX

Each project is identified by a three digit study number. The first digit identifies the responsibility centre and the next two digits identify the study.

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4 - Aquatic Ecology Division
5 - Aquatic Physics and Systems Division
6 - Analytical Methods Division
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# INTRODUCTION

In previous years, the NWRI Study Plan book presented the studies by organizational unit - the Division. This year, while the study descriptions are entered sequentially by Division and study number, this compilation is preceded by a new section of the book which lists the studies by issue or problem area. This section allows the reader to immediately see the overall effort, both direct and indirect, focused on the issue or problem. Details of the individual studies can then be referenced by finding the individual study sheets.

One important feature of this two-part organization is to demonstrate the multiple applications of many of NWRI's individual projects. For example, a project relevant to the "Toxics" issue may be relevant to the "Great Lakes" issue, the "Pesticides" issue, and the "LRTAP" issue. Another project of an entirely different nature may be relevant to the "Flood Damage" issue, the "North" and the "Dams and Diversions" issues. The fact that many of the projects are applicable to several issues simply adds to their value as research activities.

The reader will note that there are certain projects marked by an asterisk (*) as "indirectly" relevant to an issue. When read in isolation, these projects may not appear relevant to the issue. However, they are often of critical importance, especially to site-specific problems. An example is the physical study to predict resuspension of sediment in Lake St. Clair. Such results are critical to a long-term assessment of the recovery of Lake St. Clair from contamination by toxic chemicals.

January 15, 1985

NATIONAL WATER RESEARCH INSTITUTE

1985-86 Study Plans

Organized by

Departmental Priorities/Issues

January 1985
Document #2244d

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## A. Research and Development, and Scientific Service Projects

## A-1 National Water Research Institute

## TOXIC CHEMICALS RESEARCH (related to TCMP)

### TCMP National Objective

"To achieve a state in which chemicals in Canada are managed and used in a way that will achieve and maintain a condition of the environment necessary for the health and well-being of man and the health and diversity of species and ecosystems."

### TCMP-DOE Environmental Sensing Sub-Objective

"To predict, verify, assess and monitor impacts and trends of toxic chemicals on environmental quality and to assess ecosystem health."

### NWRI Toxic Chemicals Research Program (TCRP) Sub-Sub-Objective (LTOP)

Sound water resource management of polluted aquatic ecosystems; effluent control strategies; registration of pesticides or use of toxic chemicals can only be conducted if based on a solid and defensible knowledge of the real or predicted pathways, fate and effects of these toxic chemicals in Canadian aquatic ecosystems. Thus, the NWRI Toxic Chemicals Research Program (TCRP) is aimed at resolving the actual chemical (photodegradation; hydrolysis; volatilization; sorbtion; dissolution; etc.); biological (bioavailability; biouptake; bioaccumulation, etc.); and physical (recycling by sediment resuspension, dilution by erosion-sorbtion; transport by currents; release by wave action; burial by sedimentation, etc.) pathways, fate and effects of toxic chemicals including organic, organometal, metal and radioactive contaminants. The NWRI-TCRP has three main thrusts as follows:

1. The development of sophisticated analytical techniques for all types of toxic contaminants in all types of aquatic media (compartments) and an accompanying quality assurance program for internal and external analytical quality control in DOE.

2. The development of laboratory tests (biodegradation; sediment sorption; toxicity to aquatic biota, etc.) and sophisticated physical-chemical computer models (QSAR, etc.) to predict and assess the fate and effects of new chemicals and to verify the value of laboratory test predictions by relating them to real situations as described under (3) below.

3. To assess the real pathways, fate and effects of in-situ contaminants or contaminants still being loaded to different types of aquatic ecosystems throughout Canada but with particular emphasis on the Great Lakes, especially the impact of effluents added to connecting channels.

The NWRI Toxic Chemicals Research Program is delivered through a series of research projects/studies which are supported by support and management studies. The following NWRI studies are part of Toxic Chemicals Research:

| # | Title | Leader |
|---|---|---|
| **Analytical Method Development and Quality Assurance** | | |
| a. Analytical Method Development | | |
| 601 | Supercritical Fluid Chromatography - Application to N-containing PAHs | Onuska |
| 602 | Sample Introduction on Systems for Atomic Spectroscopy on G.C. | Goulden |
| 603 | Electrochemistry and Flow Injection Analysis in Water | Sekerka |
| 604 | Methods for Toxaphenes, Phthalates and Sulfur Containing Compounds | Scott |
| 610 | Determination of Nitrogen-Containing PAHs (Aza-arenes) | Onuska |
| 611 | Operation of Clean Hazardous Chem. Lab. & Separation of Trace Organics | Sekerka |
| 612 | Radioimmunoassay Technique for Dioxins | Sherry |
| 642 | Organic Methods Development | Stokker |
| b. Quality Assurance | | |
| 643 | WQB and PPWB Quality Assurance Program | Alkema |
| 644 | Certified Reference Materials, Preservation, and National Q.C. Study | Cheam |
| 645 | Federal/Provincial Quality Assurance Program | Chau |
| 646 | Preservation of Organics | Lee |
| 650 | IJC Quality Control (Interlab Studies) | Aspila |
| 652 | Quality Assurance Program - Dredging | Lee |
| 653 | Quality Assurance Program and CRM Development for Organics | Lee |
| **Laboratory Tests for Predicting Fate and Effects** | | |
| 210 | Structure-Activity Correlation (QSAR) of Contaminants | Kaiser |
| 214 | Microbial Degradation of Chlorophenols | Baxter |
| 215 | Assessment and Removal of Contaminants by Biotechnology | Liu |
| 217 | Accumulation/Toxicity of Organic Contaminants by Yeast/Fungi | Kwasniewska |
| 224 | Environmental Distribution of Toxic Chemicals | Strachan |
| 230 | Speciation, Concentration, Pathways of Alkylleads in the Environment | Chau |

## Pathways, Fate and Effects of Contaminants in Polluted Aquatic Ecosystem in Canada

a. Chemical

| | | |
|---|---|---|
| 140 | Upper Great Lakes Channel Study - Coordination | Rodgers |
| 163 | Northern Hydro Limnology | Carmack |
| 183 | Contaminant Pathways in Prairie and Northern Rivers | Ongley |
| 211 | Bioavailability of Organic Contaminants in Sediment | Oliver |
| 212 | Organic Contaminants in the Great Lakes Basin | Kaiser |
| 213 | Chlorinated Hydrocarbons in Sediments and Biota of the Great Lakes | Oliver |
| 220 | Transport of Persistent Organics in Niagara, St. Lawrence R. & L. Ontario | Fox |
| 221 | Polynuclear Aromatic Hydrocarbons (PAHs) in Freshwater Environments | Nagy |
| 225 | Pathway of Organic Contaminants in Fluvial Systems | Carey |
| 230 | Speciation, Concentration, Pathways of Alkylleads in the Environment | Chau |
| 233 | Fate of Amines in Aquatic Systems | Maguire |
| 234 | Metal Speciation in the St. Lawrence River | Lum |
| 236 | Physico-chemical Properties and Metal Distribution in Sediment | Mudroch |
| 241 | Levels and Pathways of Radionuclides in the Great Lakes | Joshi |
| 242 | Aquatic Pathways of Radionuclides Released by Uranium Mining | Joshi |
| 243 | Partitioning of Radionuclides at Natural Interfaces in Aquatic Systems | Platford |
| 251 | Geochemical Controls of Aquatic Systems Response to Acid Raid | Jeffries |
| 323 | Dynamics of Sediments - Toronto Harbour | Coakley |
| 341 | Water Quality and Quantity in Urban Runoff | Marsalek |
| 342 | Waterford River Basin - Newfoundland | Marsalek |
| 346 | Upper Great Lakes Connecting Channels | Lau |
| 405 | Trace Metal Dynamics in Acid Sensitive Lakes of Nova Scotia | Wong/<br>Nriagu |
| 407 | Statistical Analyses of Environmental Data | Esterby |
| 408 | Covariation of Nutrients and Contaminants | Esterby |
| 413 | Sulfur, Its Forms and Isotopic Composition in Acid Sensitive Lakes | Nriagu |
| 415 | Long-Range Transport of Metals by Atmospheric Processes | Glooschenko |
| 416 | Origin of Organic Waters and Their Impact on Aquatic Ecosystems | Bourbonniere |
| 420 | Sediment Contaminants Transport and Phosphorus Regeneration in L. Erie | Rosa |
| 422 | St. Lawrence and Niagara River Contaminants Sediment Transport | Charlton |
| 431 | Taste, Odour and Toxins From Blue-Green Algal Blooms | Brownlee |
| 436 | Impact of Organic Colloids on Heavy Metal Speciation in Surface Waters | Leppard |

a. Chemical - continued

| | | |
|---|---|---|
| 501 | Water Quality Radionuclide Transport and Sediment Contamination Models | Lam |
| 503 | Eutrophication Model of the Upper Great Lakes Connecting Channels | Simons |
| 505 | Assessment of Niagara River Water Quality | El-Shaarawi |
| 506 | Aquatic Effects of Acidic Precipitation Models and Monitoring | Thompson |
| 507 | Watershed Acidification Models | Lam |
| 508 | Evaluation and Interpretation of LRTAP Monitoring Program | Fraser |
| 514 | Niagara River Plume | Murphy |

b. Biological

| | | |
|---|---|---|
| 180 | Effects Assessment Techniques Using Benthic Communities | Warwick |
| 211 | Bioavailability of Organic Contaminants in Sediment | Oliver |
| 220 | Transport of Persistent Organics in Niagara, St. Lawrence R. & L. Ontario | Fox |
| 223 | Macroinvertebrates as Biomonitors of Environmental Contamination | Metcalfe |
| 225 | Pathways of Organic Contaminants in Fluvial Systems | Carey |
| 230 | Speciation, Concentration, Pathways of Alkylleads in the Environment | Chau |
| 233 | Fate of Amines in Aquatic Systems | Maguire |
| 236 | Physico-chemical Properties and Metal Distribution in Sediment | Mudroch |
| 414 | Use of Algal Indicators to Interpret Lake Acidification Histories | Glooschenko |
| 423 | Biological Assessment of Water Quality Using Invertebrate Indicators | Kalas |
| 498 | Evaluate Cladophora to Assess Trends in Eutrophication | Painter |

c. Physical

| | | |
|---|---|---|
| 341 | Water Quality and Quantity in Urban Runoff | Marsalek |
| 342 | Waterford River Basin - Newfoundland | Marsalek |
| 501 | Water Quality Radionuclide Transport and Sediment Contamination Models | Lam* |
| 503 | Eutrophication Model of the Upper Great Lakes Connecting Channels | Simons* |
| 504 | Toxic Contaminant Model for the Lake St. Clair System | Halfon* |
| 510 | Great Lakes Connecting Channels - Circulation Patterns in Lake St. Clair | Murthy* |
| 512 | Circulation Within Great Lakes Coastal Zones | Boyce* |
| 540 | Application of Remote Optical Measurements to Lake Research | Bukata* |

## A-2 National Water Research Institute

## PESTICIDES CONTAMINATION RESEARCH

### National Objective

Pesticide use and regulation are issues of consistent public debate in Canada. Decisions on pesticide use have national and international impact on the global commodity market in agriculture and forestry products and the multi-national chemical industry. The Minister has also declared this issue to be one of his top priorities.

While federal pesticide regulation is the administrative responsibility of Agriculture Canada, DOE plays an important advisory role with the responsibility of ensuring that the use of pesticides will not instigate an unwarranted environmental hazard. Independent of, but as an adjunct to, our responsibilities as advisors to Agriculture Canada, DOE must constantly re-assess existing 'in use' pesticides to reflect evolving science and technology as well as the evolving public perception and concern surrounding pesticide use.

### DOE Sub-Objectives

1. Establish and maintain a coordinated DOE role in the pesticide regulatory process and contribute to the improved coordination of pesticide registration.

2. Provide to the Department of Agriculture DOE's evaluation and recommendations regarding pesticide use to ensure the minimization of adverse environmental impact.

3. Develop the scientific rationale and data base for specific recommendations on the use and registration status of existing pesticide products by establishing priorities for coordinating and evaluating environmental impact assessment of existing pesticide products.

4. Develop and implement environmentally sound pest control programs to enhance the management of renewable forest resources.

### NWRI Sub-Objectives

1. To identify the levels and the factors controlling the fate and bioaccumulation of organic contaminants in rivers and streams.

2. To determine toxicities of individual chemicals with typical functional groups and structures to representative organisms, such as fish, yeasts, fungi, and bacteria.

3. To examine the kinetics of the distribution of selected organochlorine contaminants between the solid particulate phase and the dissolved phase in the Niagara River plume area of Lake Ontario.

4. To provide simulation models of exposure assessments for toxic chemicals by predicting their distribution and fate in different compartments of the environment.

5. To determine the occurence and distribution of 2,4-D in Buckhorn Lake water and sediment during the 1984 herbicide application season.

6. To provide information on the presence, characteristics, pathways and actual and potential impacts of toxic chemicals in the ecosystem.

7. Development of new Certified Reference Materials and preparation of reports to summarize all data generated. Design and implementation of interlaboratory Quality Assurance Studies for toxic organics.

8. To develop, field test, and transmit to operational sectors, ambient monitoring protocols and interpretive guidelines for measurement and effects management of toxic substances in prairie and northern aquatic systems.

NWRI Program

NWRI studies relevant to pesticides include:

| # | Title | Leader |
|---|---|---|
| Chemical | | |
| 210 | Structure-Activity Correlation (QSAR) of Contaminants | Kaiser |
| 214 | Microbial Degradation of Chlorophenols | Baxter |
| 215 | Assessment and Removal of Contaminants by Biotechnology | Liu |
| 220 | Transport of Persistent Organics in Niagara, St. Lawrence R. & L. Ontario | Fox |
| 224 | Environmental Distribution of Toxic Chemicals | Strachan |
| 225 | Pathways of Organic Contaminants in Fluvial Systems | Carey |
| 230 | Speciation, Concentration, Pathways of Alkylleads in the Environment | Chau |

## Measurement and Quality Assurance

| | | |
|---|---|---|
| 602 | Sample Introduction on Systems for Atomic Spectroscopy on G.C. | Goulden |
| 611 | Operation of Clean Hazardous Chem. Lab. & Separation of Trace Organics | Sekerka |
| 612 | Radioimmunoassay Techniques for Dioxins | Sekerka |
| 642 | Organic Methods Development | Stokker |
| 643 | WQB and PPWB Quality Assurance Program | Alkema |
| 646 | Preservation of Organics | Lee |
| 650 | IJC Quality Control (Interlab Studies) | Aspila |

## 1-3 National Water Research Institute

## ACID RAIN AND ATMOSPHERIC DEPOSITION RESEARCH

(Related to the National LRTAP Program)

### LRTAP National Objective (ECS)

To predict impacts of airborne pollutants on aquatic ecosystems, wildlife populations and lands and to monitor the effects of such impacts.

### Long-Term Goals of the NWRI Program

A. To provide scientific guidance to IWD/WQB; to develop and to carry out a satisfactory program to monitor the effects of LRTAP on the aquatic regimes of Canada.

| # | Title | Leader |
|---|---|---|
| 506 | Aquatic Effects of Acidic Precipitation Models and Monitoring | Thompson |
| 508 | Evaluation and Interpretation of LRTAP Monitoring Program | Fraser |

B. To carry out research designed to develop a more complete understanding of the processes altered by acid rain or other components of atmospheric deposition, and their impact on water quality.

| # | Title | Leader |
|---|---|---|
| 224 | Environmental Distribution of Toxic Chemicals | Strachan |
| 250 | Hydrogeochemical Responses of Turkey Lakes to Acid Rain | Semkin |
| 251 | Geochemical Controls of Aquatic System Response to Acid Rain | Jeffries |
| 405 | Trace Metal Dynamics in Acid Sensitive Lakes of Nova Scotia | Wong/<br>Nriagu |
| 407 | Statistical Analyses of Environmental Data | Esterby |
| 413 | Sulfur, Its Forms and Isotopic Composition in Acid Sensitive Lakes | Nriagu |

| | | |
|---|---|---|
| 415 | Long-Range Transport of Metals by Atmospheric Processes | Glooschenko |
| 416 | Origin of Organic Waters and Their Impact on Aquatic Ecosystems | Bourbonniere |
| 627 | Organic Matter Biodegradation in Lake Sediments – Effect of Acid Stress | Rao |

C. To provide capability and methodology to synthesize the information from the IWD research program into a simulation model of aquatic regime acidification or other reactions to LRTAP stress.

| # | Title | Leader |
|---|---|---|
| 507 | Watershed Acidification Models | Lam |

D. To ensure that the analytical data collected for the LRTAP program are reliable by conducting, on a continuous basis, an interlaboratory quality assurance program for all laboratories contributing data to the program.

| # | Title | Leader |
|---|---|---|
| 602 | Sample Introduction on Systems for Atomic Spectroscopy on G.C. | Goulden |
| 603 | Electrochemistry and Flow Injection Analysis in Water | Sekerka |
| 604 | Methods for Toxaphenes, Phthalates and Sulfur Containing Compounds | Scott |
| 610 | Determination of Nitrogen-Containing PAHs (Aza-arenes) | Onuska |
| 612 | Radioimmunoassay Techniques for Dioxins | Sherry |
| 644 | Certified Reference Materials, Preservation, and National Q.C. Study | Cheam |
| 651 | LRTAP Interlaboratory Quality Control Studies | Aspila |

## 1-4 National Water Research Institute

## GREAT LAKES WATER QUALITY AGREEMENT RESEARCH - (i) TOXICS

### ECS/NWRI Sub-Objective

Responding to the general DOE objective of environmental protection (B), NWRI activities are relevant o the ECS sub-objective (4):

> "Contribute to the protection of the environment and humans from toxic chemicals, and from damaging pollutants which cross international or interprovincial boundaries or which affect federally managed resources."

### NWRI GLWQA Toxics Research Program Sub-Sub-Objective

Sound Great Lakes water quality management with regard to toxic chemicals can only be conducted if based on a solid, defensible understanding of the pathways, fate, and effects of these chemicals. Thus, the NWRI-GLWQA Toxics Research Program is aimed at resolving the actual chemical, biological, and physical pathways for organic, organometallic, metallic, and radioactive contaminants in the Great Lakes, and determining their ultimate fate and effects. Three main research thrusts are relevant:

1. measurement and assessment of the pathways, fate and effects of in-situ contaminants or contaminants still being loaded to the Great Lakes from effluents added to connecting channels.

2. development of laboratory tests and computer-based models to predict and assess the fate and effects of toxic contaminants in the Great Lakes and relate them to the observations made in 1) above.

3. development of sophisticated analytical techniques for measurement of the contaminants along with an associated quality assurance program.

The NWRI GLWQA Toxics Objectives are delivered through a series of research studies supported by support and management studies. The following NWRI studies are associated with GLWQA Toxics:

| # | Title | Leader |
|---|---|---|
| **Pathways, Fate and Effects of Toxic Contaminants in the Great Lakes** | | |
| a. Chemical | | |
| 109 | Habitat Studies | Sly |
| 140 | Upper Great Lakes Channel Study - Coordination | Rodgers |
| 211 | Bioavailability of Organic Contaminants in Sediment | Oliver |
| 212 | Organic Contaminants in the Great Lakes Basin | Kaiser |
| 234 | Metal Speciation in the St. Lawrence River | Lum |

| | | |
|---|---|---|
| 236 | Physico-chemical Properties and Metal Distribution in Sediment | Mudroch |
| 241 | Levels and Pathways of Radionuclides in the Great Lakes | Joshi |
| 243 | Partitioning of Radionuclides at Natural Interfaces in Aquatic Systems | Platford |
| 323 | Dynamics of Sediments - Toronto Harbour | Coakley |
| 341 | Water Quality and Quantity of Urban Runoff | Marsalek |
| 346 | Upper Great Lakes Connecting Channels | Lau |
| 408 | Covariation of Nutrients and Contaminants | Esterby |
| 420 | Sediment Contaminants Transport and Phosphorus Regeneration in L. Erie | Rosa |
| 424 | Upper Lakes Connecting Channels Data Compilation | Dobson |
| 505 | Assessment of Niagara River Water Quality | El-Shaarawi |
| 514 | Niagara River Plume | Murthy |

b. Biological

| | | |
|---|---|---|
| 213 | Chlorinated Hydrocarbons in Sediments and Biota of the Great Lakes | Oliver |
| 220 | Transport of Persistent Organics in Niagara, St. Lawrence R. & L. Ontario | Fox |
| 230 | Speciation, Concentration, Pathways of Alkylleads in the Environment | Chau |
| 414 | Use of Algal Indicators to Interpret Lake Acidification Histories | Glooschenko |
| 423 | Biological Assessment of Water Quality Using Invertebrate Indicators | Kalas |
| 433 | Impact of Contaminants on Microbial Activities | Burnison |
| 498 | Evaluate Cladophora to Assess Trends in Eutrophication | Painter |
| 626 | Microbial Response to Loadings | Rao |

c. Physical

| | | |
|---|---|---|
| 322 | Littoral and Fluvial Sedimentology and Geotechnique | Coakley* |
| 342 | Waterford River Basin - Newfoundland | Marsalek* |
| 422 | St. Lawrence and Niagara River Contaminants Sediment Transport | Charlton* |
| 501 | Water Quality, Radionuclide Transport and Sediment Contamination Models | Lam* |
| 504 | Toxic Contaminant Model for the Lake St. Clair System | Halfon* |
| 510 | Great Lakes Connecting Channels - Circulation Patterns in Lake St. Clair | Murthy* |
| 512 | Circulation within Great Lakes Coastal Zones | Boyce* |
| 540 | Application of Remote Optical Measurements to Lake Research | Bukata* |

Laboratory Tests and Models for Prediction of Fate and Effects

| | | |
|---|---|---|
| 210 | Structure-Activity Correlation (QSAR) of Contaminants | Kaiser |
| 211 | Bioavailability of Organic Contaminants in Sediment | Oliver |
| 215 | Assessment and Removal of Contaminants by Biotechnology | Lui |
| 217 | Accumulation/Toxicity of Organic Contaminants by Yeast/Fungi | Kwasniewska |
| 224 | Environmental Distribution of Toxic Chemicals | Strachan |

## Analytical Methods Development/Quality Assurance

| | | |
|---|---|---|
| 601 | Supercritical Fluid Chromatography - Application to N-containing PAHs | Onuska |
| 602 | Sample Introduction on Systems for Atomic Spectroscopy on G.C. | Goulden |
| 603 | Electrochemistry and Flow Injection Analysis in Water | Sekerka |
| 604 | Methods for Toxaphenes, Phthalates and Sulfur Containing Compounds | Scott |
| 605 | General Maintenance and Technology Transfer | Sekerka |
| 611 | Operation of Clean Hazardous Chem. Lab. & Separation of Trace Organics | Sekerka |
| 612 | Radioimmunoassay Techniques for Dioxins | Sherry |
| 642 | Organic Methods Development | Stokker |
| 644 | Certified Reference Materials, Preservation, and National Q.C. Study | Cheam |
| 646 | Preservation of Organics | Lee |
| 650 | IJC Quality Control (Interlab Studies) | Aspila |
| 652 | Quality Assurance Program - Dredging | Lee |
| 653 | Quality Assurance Program and CRM Development for Organics | Lee |

## A-4 National Water Research Institute

## GREAT LAKES WATER QUALITY AGREEMENT RESEARCH - (ii) Eutrophication

1. In the 1978 Great Lakes Water Quality Agreement, eutrophication and related problems of the enrichment of the lakes are addressed in several locations, suggesting that this area remains a high priority issue in the Great Lakes region.

   Annex 3 of the Agreement addresses the control of phosphorus very specifically as follows:

   Section 1: The purpose is to minimize eutrophication problems and to prevent degradation with regard to phosphorus in the boundary waters of the Great Lakes System. The goals of phosphorus control are:

   (a) Restoration of year-round aerobic conditions in the bottom waters of the Central Basin of Lake Erie;
   (b) Substantial reduction in the present levels of algal biomass to a level below that of a nuisance condition in Lake Erie;
   (c) Reduction in present levels of algal biomass to below that of a nuisance condition in Lake Ontario including the International Section of the St. Lawrence River;
   (d) Maintenance of the oligotrophic state and relative algal biomass of Lakes Superior and Huron;
   (e) Substantial elimination of algal nuisance growths in Lake Michigan to restore it to an oligotrophic state; and
   (f) The elimination of algal nuisance in bays and in other areas wherever they occur.

   Section 2(e) calls for "maintenance of a viable research program to seek maximum efficiency and effectiveness in the control of phosphorus introductions into the Great Lakes".

2. NWRI continues to conduct research on all aspects of eutrophication to enable both the establishment of long-term trends demonstrating the success rate of P-controls and the development of models for the long-term prediction of trophic state, to assist decision-makers in responding to future requests for action and development.

   NWRI Eutrophication studies were broadened to include food-chain considerations with special emphasis on secondary (zooplankton, benthic invertebrates) production and its interrelationship with nutrient (as well as contaminant) regimes; to improve statistical methods of surveillance data evaluation, and to investigate any emerging problems and issues (taste and odour in drinking water, increased reappearance of Cladophora in Lake Ontario, etc.)

Eutrophication

| # | Title | Leader |
|---|---|---|
| 102 | Eutrophication | Vollenweider |
| 140 | Upper Great Lakes Channel Study - Coordination | Rodgers |
| 408 | Covariation of Nutrients and Contaminants | Esterby* |
| 424 | Upper Lakes Connecting Channels Data Compilation | Dobson* |
| 428 | Bioavailability of Phosphorus | Manning |
| 429 | Thermocline Oxygen Dynamics | Charlton |
| 431 | Taste, Odour and Toxins From Blue-Green Algal Blooms | Brownlee |
| 438 | Effect of Contaminants in Nutrient Kinetics | Lean |
| 490 | Immediate Bioavailability of Phosphorus in Grand River Sediments | Abbott |
| 498 | Evaluate Cladophora to Assess Trends in Eutrophication | Painter |
| 501 | Water Quality Radionuclide Transport and Sediment Contamination Models | Lam* |
| 503 | Eutrophication Model of the Upper Great Lakes Connecting Channels | Simons |
| 505 | Assessment of Niagara River Water Quality | El-Shaarawi* |
| 512 | Circulation within Great Lakes Coastal Zones | Boyce* |
| 626 | Microbial Response to Loadings | Rao |

## A-4 National Water Research Institute

## GREAT LAKES WATER QUALITY AGREEMENT RESEARCH (iii) Surveillance

NWRI provides a direct support to the GLWQA through activities that are included under Program 14, GLWQA Support Services. One element of that Support is the contribution to the Great Lakes Surveillance program that is developed and carried out under the Canada-Ontario Agreement. The Surveillance program has as its objective, the monitoring of the status of the Great Lakes ecosystem, with emphasis on water quality, in order that the terms of the Canada-U.S. Great lakes Water Quality Agreement may be fulfilled.

The surveillance program provides information from which the Ontario Regional Director General and support staff can provide reports required under the Agreement. However, research efforts are required to assure that the program is responsive to current issues; that methods and technology are available for surveillance; that sampling programs are designed to achieve statistical confidence in results; and that adequate models are available for quantitative application of the surveillance results.

The NWRI program of research is closely interrelated to GLWQA Support (see B-4) and with the IWD-OR surveillance staff who are responsible for program implementation. The research activities are developed through interchange of requirements and are focused through the COA Surveillance Workgroup.

| # | Title | Leader |
|---|---|---|
| 109 | Habitat Studies | Sly |
| 407 | Statistical Analyses of Environmental Data | Esterby |
| 408 | Covariation of Nutrients and Contaminants | Esterby |
| 424 | Upper Lakes Connecting Channels Data Compilation | Dobson |
| 429 | Thermocline Oxygen Dynamics | Charlton |
| 438 | Effect of Contaminants in Nutrient Kinetics | Lean |
| 501 | Water Quality, Radionuclide Transport and Sediment Contamination Models | Lam |
| 503 | Eutrophication Model of the Upper Great Lakes Connecting Channels | Simons |
| 504 | Toxic Contaminant Model for the Lake St. Clair System | Halfon |
| 505 | Assessment of Niagara River Water Quality | El-Shaarawi |
| 509 | Modelling Thermal Structure of Natural Water Bodies | Schertzer |

| # | Title | Leader |
|---|---|---|
| 512 | Circulation Within Great Lakes Coastal Zones | Boyce |
| 513 | Technology Transfer and Information Services | Bull* |
| 514 | Niagara River Plume | Murthy |
| 571 | CCIW Data Archiving | Nagel |

## A-4 National Water Research Institute

## GREAT LAKES WATER QUALITY AGREEMENT RESEARCH - (iv) Upper Great Lakes Connecting Channel Study (UGLCCS)

While considerable progress has been made on the control of pollution in the Upper Great Lakes Connecting Channels, these areas continue to be designated as "Areas of Concern" by the International Joint Commission. Hence, Canadian and U.S.A. agencies have agreed to assess water quality and related problems in the St. Mary's, St. Clair and Detroit Rivers, and in Lake St. Clair and to prepare a report on this assessment and the actions required to address remaining concerns by 1988.

The objectives of this overall Study are:

1. To determine the existing environmental condition of the St. Mary's River, St. Clair River, Lake St. Clair, and the Detroit River to determine information gaps.

2. To undertake additional studies, as needed, to:

   a. identify and quantify the impacts of conventional and toxic substances from point sources, nonpoint sources (both runoff and contaminanted groundwater) and tributaries, on beneficial human uses and on plant and animal populations in, along, and below these waterways;

   b. determine the adequacy of existing or proposed control programs to ensure or restore beneficial uses; and

   c. recommend appropriate control and surveillance programs to protect and monitor these waterways and the downstream lakes.

The multi-agency Management Committee for the Study has organized the work into 8 main Activities. The NWRI studies contributing to each activity are listed below.

Throughout NWRI work, the effort is directed to assessment of conditions, to the identification and estimation of the relative significance of sources, to model the systems and to integrate the information developed. The output will be advice on remedial strategies and efficient, effective surveillance methodology.

| # | | Title | Leader |
|---|---|---|---|
| A. | Planning, Administration, Data and Report Writing | | |
| | A4 | Writing of Final Report (AIC) | |
| 140 | | Upper Great Lakes Channel Study - Coordination | Rodgers |
| | A5 | Information Exchange | |
| 571 | | CCIW Data Archiving | Nagel |

## B. Quality Assurance/Quality Control

| | | | |
|---|---|---|---|
| | B1 | Inter-Laboratory Performance | |
| 654 | | Quality Assurance Program - UGLCCS | Chau |
| | B2 | QA/QC Field & Intra-Laboratory | |
| 654 | | Quality Assurance Program - UGLCCS | Chau |
| | B4 | QA/QC Inter Project Split Samples | |
| 654 | | Quality Assurance Program - UGLCCS | Chau |

## C. Models

| | | | |
|---|---|---|---|
| | C1 | Black Box, Mass Balance | |
| 504 | | Toxic Contaminant Model for the Lake St. Clair System | Halfon |
| | C2 | Special Studies (Lake St. Clair) | |
| 503 | | Eutrophication Model of the Upper Great Lakes Connecting Channels | Simons |
| | C4 | Current Measurements and Related Parameters (Lake St. Clair) | |
| 510 | | Great Lakes Connecting Channels - Circulation Patterns in Lake St. Clair | Murthy |

## D. Point Sources/Discharges

## E. Non-Point Sources

| | | | |
|---|---|---|---|
| | E8 | Urban Storm Water | |
| 346 | | Upper Great Lakes Connecting Channels | Lau |

## F. Water Quality

| | | | |
|---|---|---|---|
| | F3 | Supplementary Analyses of Ambient Water Selected Contaminants | |
| 212 | | Organic Contaminants in the Great Lakes Basin | Kaiser |
| 213 | | Chlorinated Hydrocarbons in Sediments and Biota of the Great Lakes | Oliver |
| 230 | | Speciation, Concentration, Pathways of Alkylleads in the Environment | Chau |
| 424 | | Upper Lakes Connecting Channels Data Compilation | Dobson |

## G. Sediments

| | | | |
|---|---|---|---|
| | G1 | Botton Sediment Mapping | |
| 324 | | Sedimentology, Lower Great Lakes - Lac St. Louis | Rukavina |

## G. Sediments

| | | | |
|---|---|---|---|
| | G2 | Organic Toxics & Heavy Metals | |
| 211 | | Bioavailability of Organic Contaminants in Sediment | Oliver |
| 213 | | Chlorinated Hydrocarbons in Sediments and Biota of the Great Lakes | Oliver |
| 221 | | Polynuclear Aromatic Hydrocarbons (PAHs) in Freshwater Environments | Nagy |
| 230 | | Speciation, Concentration, Pathways of Alkylleads in the Environment | Chau |
| 236 | | Physico-chemical Properties and Metal Distribution in Sediment | Mudroch |
| 428 | | Bioavailability of Phosphorus | Manning |
| | G3 | Transport and Flux of Sediments and Associated Toxic Organics and Heavy Metals | |
| 510 | | Great Lakes Connecting Channels - Circulation Patterns in Lake St. Clair | Murthy |
| 511 | | Storm Surge Simulation on Lake Erie and Lake St. Clair | Hamblin |
| 512 | | Circulation within Great Lakes Coastal Zones | Boyce |
| 513 | | Technology Transfer and Information Services | Bull |
| 540 | | Application of Remote Optical Measurement to Lake Research | Bukata |

## H. Biota

| | | | |
|---|---|---|---|
| | H1 | Benthic Organics | |
| 217 | | Accumulation/Toxicity of Organic Contaminants by Yeast/Fungi | Kwasniewska |
| 406 | | Effect of Climate on Water Quality of Canadian Lakes | Delorme |
| | H4 | Contaminants in Sports Fish | |
| 230 | | Speciation, Concentration, Pathways of Alkylleads in the Environment | Chau |
| | H6 | Contaminants in Benthos | |
| 211 | | Bioavailability of Organic Contaminants in Sediment | Oliver |

## A-5 National Water Research Institute

## EUTROPHICATION RESEARCH

NWRI Eutrophication Research is an integral part of the National Program "Water Management Research" with the overall objective: To advance knowledge and provide information and understanding required for the solution of water management problems and the realization of water development opportunities (in the fields of aquatic ecology, aquatic physics and systems, and hydraulics).

NWRI contributed to the solution of problems associated with the degradation of the aquatic environment as a consequence of eutrophication (nutrient enrichment from urbanization, industrialization, and intensive agriculture in six major interdisciplinary areas:

A. Determination of the fate and impact of nutrient loading and nutrient processes in rivers, lakes and reservoirs and degree of dissolved oxygen depletion; analysis of the algal growth problem, development of control, conservation and rehabilitation strategies, setting of nutrient standards and establishing target loading.

| # | Title | Leader |
|---|---|---|
| 102 | Eutrophication | Vollenweider |
| 406 | Effect of Climate on Water Quality of Canadian Lakes | Delorme |
| 407 | Statistical Analyses of Environmental Data | Esterby |
| 408 | Covariation of Nutrients and Contaminants | Esterby |
| 420 | Sediment Contaminants Transport and Phosphorus Regeneration in L. Erie | Rosa |
| 421 | Lake Simcoe Rehabilitation Study - Oxygen Regime | Charlton |
| 422 | St. Lawrence and Niagara River Contaminants Sediment Transport | Charlton |
| 423 | Biological Assessment of Water Quality Using Invertebrate Indicators | Kalas* |
| 424 | Upper Lakes Connecting Channels Data Compilation | Dobson |
| 428 | Bioavailability of Phosphorus | Manning |
| 429 | Thermocline Oxygen Dynamics | Charlton |
| 431 | Taste, Odour and Toxins From Blue-Green Algal Blooms | Brownlee |
| 438 | Effect of Contaminants in Nutrient Kinetics | Lean |
| 490 | Immediate Bioavailability of Phosphorus in Grand River Sediments | Abbott |
| 498 | Evaluate Cladophora to Assess Trends in Eutrophication | Painter |

B. Assessment of infestation of recreational and navigable water bodies by indigenous and exotic species of aquatic weeds, for the purpose of developing and assessing effective strategies to prevent control or eliminate the degradation of recreational water use, and/or to counter their adverse effect on navigation and river conveyance characteristics.

| # | Title | Leader |
|---|---|---|
| 477 | Eurasian Watermilfoil Control | Painter |
| 478 | Aquatic Weeds Coordination and Technology Transfer | Painter |

C. Definition of the ecological characteristics and instability of sensitive areas of Canada's West (prairie lakes, reservoirs); and evaluation of whole lake restoration schemes for their rehabilitation.

| # | Title | Leader |
|---|---|---|
| 162 | Thompson River Algal Ecology | Bothwell |
| 163 | Northern Hydro Limnology | Carmack |
| 176 | Applications in Prairie Lake Physics | Kenney* |
| 180 | Effects Assessment Techniques Using Benthic Communities | Warwick |
| 183 | Contaminant Pathways in Prairie and Northern Rivers | Ongley |
| 437 | Technology Transfer and Guidance for Lake Restoration | Murphy |
| 439 | Effect of Calcite Precipitation Upon Algal Productivity in L. Ontario | Murphy |

D. Development of new and improved methods and parameters for effective water quality monitoring programmes, including micro- and macro-biological methods.

| # | Title | Leader |
|---|---|---|
| 407 | Statistical Analyses of Environmental Data | Esterby |
| 408 | Covariation of Nutrients and Contaminants | Esterby |
| 423 | Biological Assessment of Water Quality Using Invertebrate Indicators | Kalas |
| 433 | Impact of Contaminants on Microbial Activities | Burnison |
| 436 | Impact of Organic Colloids on Heavy Metal Speciation in Surface Waters | Leppard |
| 505 | Assessment of Niagara River Water Quality | El-Shaarawi |
| 626 | Microbial Response to Loadings | Rao |
| 643 | WQB and PPWB Quality Assurance Program | Alkema |
| 644 | Certified Reference Materials, Preservation, and National Q.C. Study | Cheam |
| 650 | IJC Quality Control (Interlab Studies) | Aspila |

E. Characterization and description of generic flow/diffusion processes which impact on the health of aquatic ecosystems.

| # | Title | Leader |
|---|---|---|
| 341 | Water Quality and Quantity in Urban Runoff | Marsalek |
| 342 | Waterford River Basin - Newfoundland | Marsalek |
| 512 | Circulation Within Great Lakes Coastal Zones | Boyce |
| 515 | Physical Limnology of a Yukon River Basin Lake | Hamblin |
| 540 | Application of Remote Optical Measurements to Lake Research | Bukata |

F. Development of lake models for operational use in the interpretation of WQB or WRB data and prediction of long-term water quality trends.

| # | Title | Leader |
|---|---|---|
| 501 | Water Quality, Radionuclide Transport and Sediment Contamination Models | Lam |
| 503 | Eutrophication Model of the Upper Great Lakes Connecting Channels | Simons |

## A-6 National Water Research Institute

## QUALITY ASSURANCE (QA)

### QA National Objective

To ensure that chemical data collected in support of Departmental priority programmes are compatible and of adequate and defined quality.

### NWRI-QA Objective

To establish quality assurance programmes for laboratories engaged in aquatic environmental measurements to ensure that the data generated are valid and compatible on a regional, national and international basis.

### NWRI-QA Programme

In support of data collection by other organizational components and agencies, NWRI takes the lead responsibility for quality assurance for IWD/WQB, PPWB, GLWQA, LRTAP and part of TCMP. Laboratories associated with these programmes are responsible for generating ambient water quality data in support of ECS priority programmes through repetitive analysis of water, sediments and biota taken from locations representative of baseline or changing water quality. The NWRI-QA programme ensures that the data collected by the various laboratories are compatible so that data sets can be combined for the determination of spatial and temporal trends. The program has three thrusts:

1. The organization, distribution and assessment of regional, national and international interlaboratory comparison studies for organic and inorganic contaminants.
2. The preparation and analysis of reference and certified reference materials (water, sediments, biota).
3. The preparation of specification statements on the precision, accuracy and detection limit of analytical methods contained in the WQB Analytical Methods Manual.

The NWRI programme is delivered through a series of studies supported by support and management studies. The studies are listed below:

| # | Title | Leader |
|---|---|---|
| 1. | Interlaboratory Comparison Studies | |
| 643 | WQB and PPWB Quality Assurance Program | Alkema |
| 645 | Federal/Provincial Quality Assurance Program | Chau |
| 646 | Preservation of Organics | Lee |
| 650 | IJC Quality Control (Interlab Studies) | Aspila |

## 2. Reference and Certified Reference Materials

| | | |
|---|---|---|
| 644 | Certified Reference Materials, Preservation, and National Q.C. Study | Cheam |
| 651 | LRTAP Interlaboratory Quality Control Studies | Aspila |
| 652 | Quality Assurance Program - Dredging | Lee |
| 653 | Quality Assurance Program and CRM Development for Organics | Lee |

## 1-7 National Water Research Institute

## BACTERIAL, MYCOLOGICAL AND VIRAL CONTAMINATION (BMVC)

### National Objective

"To establish bacteriological, mycological and viral knowledge base for Canadian and International waters (including drinking water sources) by using appropriate microbial tests and to monitor microbial water quality for temporal and spatial trends in order that proper management practices may be implemented to ensure the health and well being of man and the health and diversity of species within the ecosystem".

### Sub Objective

"To develop, evaluate and modify techniques in order to sensitively measure, verify, predict and assess the microbial effects of natural and anthropogenic inputs into aquatic ecosystems".

### NWRI Bacterial Mycological and Viral Contamination Programme

Safe, good quality drinking water sources, hazard free water recreational areas, aesthetically pleasing beaches and shorelines and good quality industrial waters can only be provided by maintaining a programme of increasing vigilance on the microbial quality of Canadian waters (rivers, lakes, reservoirs and marine coastal waters). Since microbes are the initial indicators of trophic and toxic assaults on our waters, they and their activities can also be used to assess and monitor changes in water and sediment quality due to chemical inputs. The programme assists in the management and utilization of water resources for the benefit of the Canadian public and the maintenance of the diversity of species found in aquatic ecosystems.

The NWRI - BMVC programme has the following main thrusts:

1. The development, assessment and field evaluation of more sensitive and reliable measurement procedures of bacterial, fungal, viral and biochemical indicators of water quality in order to develop realistic water quality criteria which will protect public health, retard eutrophication and allow for the multiple use of resources. Concurrent with the above, to document all uses in a methods manual.

2. The development, assessment, modification and application of microbiological techniques to assess the mutagenic and toxic content of waters, wastewaters and sediments.

3. The participation in national and international water quality monitoring and surveillance programmes concerned with establishing water quality criteria and baseline data.

4. The participation in studies of the fate and effect of chemical impact on microbial biota as well as to evaluate microbial enumeration and toxicity screening techniques.

5. The participation in studies of the effects of acid rain on bacterial concentrations and activities. Additional knowledge is required to determine the point at which significant morphological and physiological changes occur and the point at which microbial activities such as biodegradation and recycling and food chain effects start to take place.

The NWRI-BMVC programme is delivered through a series of research studies supported by support and management studies. NWRI studies related to BMVC are listed below:

| # | Title | Leader |
|---|---|---|
| 1. | Measurement Procedures and Establishment of Indicators | |
| 625 | Microbial and Toxicant Screening Support to IWD and NWRI Studies | Kwan |
| 2. | Mutagenic and Toxic Techniques | |
| 623 | Microbial Toxicity Screening Methods, Evaluation and Testing | Dutka |
| 624 | Bacterial Toxicity Screening Symposium | Dutka |
| 3. | Monitoring | |
| 626 | Microbial Response to Loadings | Rao |
| 4. | Microbial Effects of Acid Deposition | |
| 627 | Organic Matter Biodegradation in Lake Sediments - Effect of Acid Stress | Rao |

## A 8 National Water Research Institute

## Analytical Methodology Development Project

### National Objective

To develop and improve the sensitivity, quality and efficiency of analytical methdologies required for the determination of environmental quality.

### Sub Objective

To develop analytical methods and sampling procedures which are accurate, sensitive, cost effective and unambiguous.

### NWRI - Analytical Methodology Development Programme (AMDP)

The assessment of environmental quality and the effectiveness of control measures rely heavily on the availability of accurate, low cost and reliable analytical procedures. This program develops and evaluates analytical methodologies (including sample collection, preservation, extraction, preconcentration, clean-up and analysis) for measurements of chemical parameters in water, sediment and biota. Improvements to existing methods in terms of precision, accuracy, detection limits, cost effectiveness, automation and speciation are an integral part of the program.

The programme assists in the management and utilization of water sources as well as in the research of water chemistry, water pollution, identification of emerging problems and synergistic effects.

Other programmes dependent on analytical methodologies include Toxic Chemicals Research, Acid Rain and Atmospheric Depostion, GLWQA Research, Eutrophication Research and Pesticides Contamination Research.

The Program has the following main thrusts:

1. The development and evaluation of advanced methods and technqiues for the determination of chemical parameters of water, sediment and biota.

2. The development of screening tests for toxic substances.

3. To transfer developed techniques and methods to the client laboratories and the provision of required training.

### NWRI - AMDP Studies

The NWRI - Analytical Methodology Development Program is delivered through a series of research studies (support by Support and Management Studies). The NWRI studies related to AMDP are listed below.

| # | Title | Leader |
|---|---|---|
| Development and Evaluation | | |
| 212 | Organic Contaminants in the Great Lakes Basin | Kaiser |
| 213 | Chlorinated Hydrocarbons in Sediments and Biota of the Great Lakes | Oliver |
| 230 | Speciation, Concentration, Pathways of Alkylleads in the Environment | Chau |
| 233 | Fate of Amines in Aquatic Systems | Maguire |
| 234 | Metal Speciation in the St. Lawrence River | Lum |
| 601 | Supercritical Fluid Chromatography - Applications to N-containing PAHs | Onuska |
| 602 | Sample Introduction on Systems for Atomic Spectroscopy on G.C. | Goulden |
| 603 | Electrochemistry and Flow Injection Analysis in Water | Sekerka |
| 604 | Methods for Toxaphenes, Phthalates and Sulfur Containing Compounds | Scott |
| 605 | General Maintenance and Technology Transfer | Sekerka |
| 610 | Determination of Nitrogen-Containing PAHs (Aza-arenes) | Onuska |
| 611 | Operation of Clean Hazardous Chem. Lab. & Separation of Trace Organics | Sekerka |
| Screening Tests | | |
| 236 | Physico-chemical Properties and Metal Distribution in Sediment | Mudroch |
| 612 | Radioimmunoassay Techniques for Dioxins | Sherry |
| 623 | Microbial Toxicity Screening Methods, Evaluation and Testing | Dutka |
| 624 | Bacterial Toxicity Screening Symposium | Dutka |
| Technology Transfer | | |
| 605 | General Maintenance and Technology Transfer | Sekerka |

## A 9 National Water Research Institute

## FLOOD CONTROL/EROSION/ WAVE PREDICTION

### Water Management

The Departmental Strategic Plan identifies management of water supplies as a growing and possibly dominant issue in the 1990's. Water supplies are at risk because of growing demands in regions of low supply and because of burgeoning pollution. Conflicts in water use will increase. Solutions require improved methods to predict the effects of changing conditions on the rivers and lakes, and also the reaction of the systems to management decisions.

### Water Management Research

The research component of the larger issue of water management has the following national objective:

> To advance knowledge and provide information and understanding required for the solution of water management problems and the realization of water development opportunities.

The prediction of the effects of man-made changes on the water environment or the containing of soil materials has placed unprecedented demands for precision on predicting the effects of change, quantitatively instead of qualitatively. A major result of change is often erosion and sedimentation with related results on the winter ice regime. Changes in ice cover or the flow may cause flooding by jams or frazil. Flow differences may create a greater propensity for floods. Studies are organized to improve the capability of engineers to predict accurately the effects of decisions regarding the use or control of water in rivers, lakes, and reservoirs.

| # | Title | Leader |
|---|---|---|
| **Wave Prediction, Shoreline Impact** | | |
| 320 | Air Water Interaction | Donelan |
| 321 | Shore Conservation | Skafel |
| **Lake and Reservoir Erosion and Sedimentation** | | |
| 321 | Shore Conservation | Skafel |
| 322 | Littoral and Fluvial Sedimentology and Geotechnique | Coakley |
| 323 | Dynamics of Sediments - Toronto Harbour | Coakley |
| 324 | Sedimentology, Lower Great Lakes - Lac St. Louis | Rukavina |

## Frazil Ice, Ice Jams with Floods

| | | |
|---|---|---|
| 340 | Frazil and Anchor Ice Studies | Tsang |
| 345 | Ice Jams and Floods | Beltaos |

## Bank Overflows, River Change with Time, Sediment Transport, Dispersion

| | | |
|---|---|---|
| 343 | Mobile Bed River Flows | Lau |
| 344 | Bed Load and Suspended Sediment Measurement | Engel |
| 347 | River Flow Measurement Alternatives | Dick/Lau |

## Urban Floods

| | | |
|---|---|---|
| 341 | Water Quality and Quantity in Urban Runoff | Marsalek |
| 342 | Waterford River Basin - Newfoundland | Marsalek |

## A 10 National Water Research Institute

## RESERVOIRS AND DIVERSIONS

### Introduction

There is no National Program goal or objective directed specifically to understanding the environmental effects and ecological consequences of the construction and operation of dams, reservoirs, impoundments or diversions.

Major or minor diversions are invariably associated with dams, reservoirs, or impoundments because most will require the building of impoundment structures and the creation of reservoirs before they can be effective or maintained.

A program to study the environmental effects and ecological consequences of dams, reservoirs, impoundments or diversions has the potential of enormous depth and breadth. Research has so far been confined to the resolution of specific problems of sedimentation, ecology, water quality, hydrology, and physical limnology, in specific locations. Transfer of findings from natural lakes to impoundments within a specific basin, or in a similar geographic region, has allowed prediction of effects in proposed reservoirs, and has increased the potential for development of predictive models. However, it will be impossible to extend as generalizations, the results of research in one basin to other basins, particularly between such diverse geographic entities as those of Western Canada (e.g. Yukon) and Northeastern Canada (e.g. James Bay).

A brief survey of some of the review literature shows that there is a large amount of theoretical and practical information already available about the environmental effects of large dams and reservoirs but only a little that has been directed at understanding the effects of major diversions. Most of it is concerned with the biological consequences of transfer of undesirable organisms or biota from one basin to another. Little effort has been expended on identifying or understanding other environmental consequences that will arise in either basin.

### ECS Objective

To conserve and enhance Canada's renewable resources of water, lands, and wildlife, and their related ecosystems, and to promote their wise use in a sustainable manner for the economic and social benefit of present and future generations.

### Inland Waters Conservation

To promote sound management and development of Canada's water resources in keeping with federal responsibilities and national objectives.

## Water Management Research

To advance knowledge and to provide information and understanding required for the solution of water management problems and the realization of water development opportunities.

## NWRI Dams, Reservoirs, Impoundments and Diversions (DRID) Program

There is no separate National Programme goal for this issue (see above) and NWRI does not yet have a separately identified programme to study the environmental effects and ecological consequences of DRIDs. Research projects currently being pursued that relate directly or indirectly to DRIDs come under ECS programme Water Management Research. Most problems created by dams and diversions are related to eutrophication or toxics contamination. All of these indirectly relevant projects are not listed here. The reader is referred to Sections A-1 and A-5. Directly applied projects or projects not listed in A-1 or A-5 include:

| # | Title | Leader |
|---|---|---|
| 1. | Directly Related Studies | |
| a. | Specific to a Major Basin | |
| 163 | Northern Hydro Limnology | Carmack |
| b. | Comparative/Specific to Narrow General Fields | |
| 141 | Thermal Regime of Canadian Waters | Rodgers |
| 321 | Shore Conservation | Skafel |
| 322 | Littoral and Fluvial Sedimentology and Geotechnique | Coakley |
| 343 | Mobile Bed River Flows | Lau |
| 344 | Bed Load and Suspended Sediment Measurement | Engel |
| 515 | Physical Limnology of a Yukon River Basin Lake | Hamblin |
| c. | Specific to a Particular Concern | |
| 174 | Bioavailability of Heavy Metals in Northern Aquatic Systems | Jackson |

2. Indirectly Related Studies

| | | |
|---|---|---|
| 180 | Effects Assessment Techniques Using Benthic Communities | Warwick |
| 234 | Metal Speciation in the St. Lawrence River | Lum |
| 236 | Physico-chemical Properties and Metal Distribution in Sediment | Mudroch |
| 340 | Frazil and Anchor Ice Studies | Tsang |
| 345 | Ice Jams and Floods | Beltaos |

## A-11 National Water Research Institute

## NORTHERN RESEARCH

### DOE Northern Policy Goal

As stated in the July, 1983 Discussion Paper, "Environment Canada and the North", the DOE Policy Goal is:

> "to ensure that the department's programs and activities contribute efficiently and effectively to the protection and enhancement of environmental quality in Canada's North, and to the achievement of environmentally sound, safe and sustainable northern development."

### DOE Northern Objectives

1. To promote the establishment of a comprehensive network of protected areas in the North to provide adequate protection and management for areas and sites of significance in the preservation of Canada's natural and cultural heritage, or in the provision of opportunities for public appreciation and enjoyment of the North's natural and cultural features.

2. To promote environmentally sound technology and safe operations in northern resource exploration and development activities, in transportation and other infrastructure systems, and in community development programs.

3. To encourage sustainable utilization of the North's renewable resources, sensible use of its non-renewable resources, and the resolution of transboundary environmental issues of concern in the North.

4. To increase the information available to Canadians on the state of environmental quality and resource use in the North, and facilitate public consultations on northern environmental management policies and programs.

### NWRI Northern Research Program Objectives

1. To produce a sound knowledge base of physical, chemical and biological interactions in northern land-water systems, in support of DOE programs and pertaining to development opportunities in the North.

2. To provide technology transfer and consultative advice to operational sectors of DOE and client agencies, for ecologically sound management of northern environment.

3. To encourage and enhance research activities in northern Canada by advocacy, by participation in inter-agency research boards and activities, and by liaison with the private sector.

## NWRI Northern Research Program

The geographical extent of the NWRI Northern Research Program includes not only that area "north of 60", but also encompasses all land-water systems lying to the north of agricultural southern and prairie Canada. This vast area shares a high degree of commonality of development opportunity, environmental sensitivity, and poor knowledge base. Excluded here (but accounted for elsewhere) are studies of acid rain.

Our Northern program, although modest for reasons of cost, logistics and distance, addresses various aspects of development opportunities in Northern Canada, and contributes to understanding of ecological principles necessary for sound management of Northern aquatic systems. Many problems in the north are related to pollution by metals from mining activities. Several of the metal projects listed under 4.1 thus have indirect relevance to the North.

Although diverse in content, NWRI Northern studies have several common themes. Hydrophysical and geochemical data required for evaluation of Yukon hydroelectric development potential is addressed in studies 164 and 515. Management implications of unacceptable mercury levels in fish in hydroelectric reservoirs of northern Manitoba are the object of studies 174, 176 and 180. Studies 321, 340, 343, 344, and 345 adopt an engineering perspective of physical processes of sediment transport and artificial island stability; these have broad relevance to navigation in northern rivers (e.g. ice jams, frazil ice, river channel mobility), and to the dynamics of pollutant transfer associated with mine waste disposal and with energy exploration and refiling activities. Consultation and research planning for work in the North are ongoing processes in studies 161 and 170.

| # | Title | Leader |
|---|---|---|
| Hydroelectric Power Development | | |
| 141 | Thermal Regime of Canadian Waters | Rodgers |
| 163 | Northern Hydro Limnology | Carmack |
| 174 | Bioavailability of Heavy Metals in Northern Aquatic Systems | Jackson |
| 176 | Applications in Prairie Lake Physics | Kenney |
| 180 | Effects Assessment Techniques Using Benthic Communities | Warwick |
| 515 | Physical Limnology of a Yukon River Basin Lake | Hamblin |
| Oil/Gas Exploration and Processing | | |
| 180 | Effects Assessment Techniques Using Benthic Communities | Warwick |
| 321 | Shore Conservation | Skafel |

Mining

| | | |
|---|---|---|
| 234 | Metal Speciation in the St. Lawrence River | Lum* |
| 236 | Physico-chemical Properties and Metal Distribution in Sediment | Mudroch* |
| 344 | Bed Load and Suspended Sediment Measurement | Engel* |

Northern Transportation

| | | |
|---|---|---|
| 340 | Frazil and Anchor Ice Studies | Tsang |
| 343 | Mobile Bed River Flows | Lau |
| 344 | Bed Load and Suspended Sediment Measurement | Engel |
| 345 | Ice Jams and Floods | Beltaos |

## A 12 National Water Research Institute

### CLIMATIC CHANGE

Climate is a vital component of Canada's natural environment and its anomalies or variations, regardless of any long-term trends, have marked profound socio-economic effects. Under the Canadian Climate Program (CCP), there are initiatives to develop and improve prediction methods and to improve the applications of climate information to economic activities.

Altered temperature, wind, ice and precipitation regimes result in climatic variations of the surface energy balance and the thermal structure that could, in turn, alter nutrient fluxes, oxygen conditions and primary production of water bodies. Combining climatic data, thermodynamic models and sediment chemistry data may lead to understanding water quality responses to climatic variations.

### Objectives

The general objectives of the program are to:

a) provide the climate information required to assist in meeting Canadian social, economic and environmental objectives,
b) integrate and provide a focus, a stimulus, and an accountability for Canadian climate and climate-related activities,
c) be consistent with, and supportive of, the major goals of the World Climate Program and of Canada's interests in other international climate programs,
d) use of proxy data to reconstruct past climates, and
e) develop techniques/models to assess impacts of climatic change, particularly as they affect water quantity and quality relationships.

NWRI provides exercise to CCP in two major areas of climate-water quality area, mainly:

1) The use of paleolimnological proxy data in delineation of past climate history (e.g., using ostracode and molluscan fossils from sediment cores and pollen analysis).

| # | Title | Leader |
|---|---|---|
| 180 | Effects Assessment Techniques Using Benthic Communities | Warwick |
| 406 | Effect of Climate on Water Quality of Canadian Lakes | Delorme |

2) Application of stratification and air-water interaction models to simulate the effect of energy balance variations on the global climate.

| # | Title | Leader |
|---|---|---|
| 141 | Thermal Regime of Canadian Waters | Rodgers |
| 320 | Air-Water Interaction | Donelan |
| 509 | Modelling Thermal Structure of Natural Water Bodies | Schertzer |

## A-13 National Water Research Institute

## ENERGY RELATED RESEARCH

National energy concerns are giving rise to new developments that require additional water and the need for more knowledge about future demands. This knowledge is crucial for the development of strategies that will minimize adverse effects on the quality of water and that will optimize the use of water under the increased demand.

The hazards associated with nuclear power development, especially the effects of accidental spills and transportation and disposal of radioactive materials pose special significance to water management. Increase use of coal and peat also impose new concerns to water quality in areas of mining activity while impoundments of diversions in hydropower developments may exert profound impacts on the water resources.

The National Water Research Institute conducts research on the energy impact on water resources toward the following objective:

A. To achieve a management level understanding and prediction capability of the impact of radionuclude spills in large lakes and of the water resource impact of waste disposal.

| # | Title | Leader |
|---|---|---|
| 241 | Levels and Pathways of Radionuclides in the Great Lakes | Joshi |
| 242 | Aquatic Pathways of Radionuclides Released by Uranium Mining | Joshi |
| 243 | Partitioning of Radionuclides at Natural Interfaces in Aquatic Systems | Platford |
| 320 | Air-Water Interaction | Donelan* |
| 321 | Shore Conservation | Skafel* |
| 343 | Mobile Bed River Flows | Lau* |
| 344 | Bed Load and Suspended Sediment Measurement | Engel* |
| 501 | Water Quality, Radionuclide Transport and Sediment Contamination Models | Lam |

B. To achieve a management level ability to model the interactions of ice formation and hydro-power developments.

| # | Title | Leader |
|---|---|---|
| 163 | Northern Hydro Limnology | Carmack |
| 340 | Frazil and Anchor Ice Studies | Tsang |
| 345 | Ice Jams and Floods | Beltaos |
| 515 | Physical Limnology of a Yukon River Basin Lake | Hamblin |

C. To achieve an assessment of the wetland water resource for peat harvest and coal combustion.

| # | Title | Leader |
|---|---|---|
| 415 | Long-Range Transport of Metals by Atmospheric Processes | Glooschenko |

## A 14 National Water Research Institute

## NATIONAL/INTERNATIONAL COLLABORATION IN WATER SCIENCES

### International Program

Environmental problems are seldom unique to Canada and sometimes have global dimensions. The opportunity exists to learn from other countries, to collaborate in international standards, and to export Canadian advice or technology.

Two major formal activities are the focus of an effort that facilitates global communication on surface and groundwater science. These are:

| # | Title | Leader |
|---|---|---|
| 103 | WHO Collaborating Centre on Surface and Ground Water Quality | Barabas |
| 575 | GEMS/UNEP - Global Water Quality Data Management | Duffield |

### National Program

Opportunities exist in four major national sectors for collaboration in water science research. These are with:

1. Other federal government agencies,
2. Provincial agencies,
3. Universities, and the
4. Private sector.

Collaboration with other federal government agencies takes place primarily through programs formalized under the Interdepartmental Committee on Water (ICW), such as the GLWQA, or interdepartmental efforts as expressed in the federal government's LRTAP or Toxic Chemicals programs. The community of effort on common problems is strong, in any event, at the level of individual researcher.

Collaboration with provincial agencies is strongest when encompassed by Canada Water Act (CWA) or federal/provincial work-share agreements.

Collaboration with universities or the private sector is most direct where funds or other form of support are available for these to be drawn into assist with NWRI projects.

In these areas of collaboration, the collaborators, client, contact, or program is stipulated in the appendix for each study.

A special fund for university research is administered by RCPE/IWD/HQ. These are directed grants and all of the projects dealing with subjects within the NWRI mandate have an NWRI staff member as project reviewer or liaison officer.

Hard technology developed at NWRI for research or operations which appears to have potential for commercial exploitation is reviewed and submitted for consideration under the PILP programme. These efforts are under study:

| # | Title | Leader |
|---|---|---|
| 351 | NWRI Program for Industry Laboratory Projects (PILP) | Ford |

## A 15 National Water Research Institute

## TECHNIQUES AND CALIBRATION FOR SEDIMENTS AND WATER FLOW

**National Program:** Water Quantity Management Data

The ECS National program objective is:

> To provide comprehensive, accurate, and complete data concerning Canada's inland waters.

The Water Survey and the Sediment Survey in the Inland Waters Directorate measure river discharges and sediment loads respectively and publish as well as archive the data for use by engineers, developers, and planners. A prerequisite for reliable measurements is modern facilities and service to ensure reliable known performance.

Instruments are maintained and calibrated for the Water Survey of Canada through Study 331 which utilizes a towing tank especially designed for such a service.

Support is also given to other Departments, universities and the private sector on a cost recovery basis.

| # | Title | Leader |
|---|---|---|
| 331 | National Calibration Service | DeZeeuw |
| 344 | Bed Load and Suspended Sediment Measurement | Engel |

## B. Management and Support Projects

## B-1 National Water Research Institute

## MANAGEMENT

### Objective

To plan, manage, and control the programs and activities of the Inland Waters Directorate in an effective and efficient manner.

### NWRI Management and Administration Program

Faced with declining PY resources and the need to achieve the maximum possible benefit from every budget dollar, this Institute must continue to improve management practices and controls, and the effectiveness and efficiency of the decision making process. This will be achieved by a more regular analysis of all support functions, measuring output against established performance criteria. In addition, a more in-depth financial analysis of the research programs will permit the timely reallocation of resources to meet shifting priorities and changes in research needs. Improved Human Resource Planning will form an essential element of this endeavour and will reflect a greater emphasis on Training and Development and the employment of under-represented groups.

All avenues for the distribution of information must be explored and used to ensure that parliamentarians and the public in general become aware of the importance of Canada's water resources.

### NWRI Management and Administrative Responsibilities

(Study or Task designations)

Where easily accountable, management resources are assigned to the appropriate national programs. Overall aspects of Institute management, management systems, policy, coordination and labour, or general administration, are centred in the Director's office as a direct support to the whole Institute.

Division managers within the Institute carry principal responsibility for programs and projects within the Institute. The core support for programs as well as the management responsibilities are encompassed as follows:

### Clients

The principal client for the program is the line management for the Directorate and Service through the Director, NWRI to Senior Management.

Functional management for many support services is exercised by several HQ groups, but the principal activity centres around the IWD Director for Finance and Administration.

| # | Title | Leader |
|---|---|---|
| Overall Management | | |
| 101 | NWRI Branch Management and Administration | Egar |
| 130 | Information Technology Committee | Duffield |
| 131 | Employee Assistance Program | Egar |
| Regional Management - P&Y and W&N Regions | | |
| 161 | P&Y Program Management and Scientific Advice | Pharo |
| 170 | Program Management and Technology Transfer | Ongley |
| Toxic Chemicals (Components 2 and 3)<br>Long Range Transport of Pollutants | | |
| 200 | Environmental Contaminants Division Management and Administration | Allan |
| 201 | Environmental Contaminants Division Committee Involvement | Allan |
| 202 | Major Capital Equipment Plan | Allan |
| Hydraulics Research and Engineering<br>Drafting and Engineering Support | | |
| 310 | Hydraulics Division Management and Administration | Dick |
| Eutrophication (National and GLWQA) | | |
| 401 | Aquatic Ecology Division Research Management and Administration | Barica |
| Physical Limnology, Modelling, GLWQA, LRTAP (management for ECS and DOE), Computer Programming and Data Centre | | |
| 500 | Aquatic Physics and Systems Division Management and Administration | Bukata |
| Method Development Research, Quality Assurance (National, PPWB, LRTAP, GLWQA) and CCIW Computer | | |
| 600 | Analytical Methods Division Management and Administration | Lawrence |

| # | Title | Leader |
|---|---|---|
| Field Operations, GLWQA Surveillance, Common Support Field Equipment | | |
| 801 | Technical Operations Division Management and Administration | Macdonald |
| Finance, Administration, Building and Property, Information, Library, Safety and Affirmative Action Program | | |
| 901 | Administration | Smith |
| 910 | Advisory Committee on Under-Represented Groups | Sudar |

## B-2 National Water Research Institute

### DATA MANAGEMENT SUPPORT

The National Water Research Institute has the mandate to provide the central computer facility, the EDP programming support, and the data archiving function for the CCIW resident agencies in addition to the NWRI program. This mandate includes provision of a mainframe computer and associated operating software systems. Computer programmer training and programming assistance is provided for scientific staff and program development is undertaken on a priority basis established by the Director NWRI.

Data Archiving of water quality data for the Great Lakes is undertaken as a support to the Canada-U.S., Great Lakes Water Quality AGreement. Data bases are managed for the support of research programs of NWRI and other CCIW agencies and as a direct responsibility to the international agreement.

The Data Management function is organized into five activities within the NWRI. These are listed below for the FY 1984-85 program.

| # | Title | Leader |
|---|---|---|
| 571 | CCIW Data Archiving | Nagel |
| 572 | Water Quality Data Base Administration | Comba |
| 573 | EDP Support - Data Management | Hodson |
| 574 | Microcomputer Support | Real |
| 670 | Computer Services for Water Management Research | Pulley |

## B 3 National Water Research Institute

## SUPPORT TO NWRI and NON-NWRI AGENCIES AT CCIW

### NATIONAL OBJECTIVES

1. "To advance knowledge and provide information and understanding required for the solution of water management problems and the realization of water development opportunities."

2. "To provide comprehensive, accurate and timely data, information and advice on the quality of Canada's inland waters."

3. "To plan, manage and control the policies, programs and activities of the Inland Waters Directorate in an effective and efficient manner."

### "Non NWRI Support" Program

The planning and management of water resources depends on complete, up-to date, and easily accessible data bases which include basic water quality data. In support of data collection by other Organizational Components within ECS and in particular the Water Quality Branch (WQB), NWRI takes lead responsibility for analytical methods adaptation and quality assurance. WQB is responsible for the collection of ambient water quality data and development of water quality objectives in support of ECS priority programs through repetitive sampling and analysis of water taken from locations representative of baseline water quality in major watersheds and at boundaries between jurisdictions. This program extends to collaborating university, provincial, U.S. and private laboratories.

The acquisition of reliable data for water resources begins with instruments which measure to know accuracies. Data are obtained by federal, provincial, university and business organizations. All of these require a central, efficient and responsive service which is provided by NWRI.

NWRI also provides logistical and technical support - instrumentation, drafting, engineering, computer, computer programming and data base management support, and administrative support under this program.

The NWRI and Non-NWRI Support program has the following thrusts:

1. Provide a bimonthly interlaboratory quality assurance program for WQB labs.

2. Provide a national quality assurance program for other federal and provincial laboratories, industry laboratories, university and private laboratories.

3. Provide development, adaptation and evaluation of analytical methods, of sample handling techniques and of storage techniques for WQB laboratories.

4. Prepare reference materials in all elements of the program.

5 Provide manufacturing, technical development and consultation services.

6. Develop instrumentation for physical limnology and to aid in the presentation and interpretation of Great Lakes physical data.

7. Provide media and wash-up support and maintain common-use laboratory equipment and a stock of cultures of bacteria.

8. Provide warehousing, field equipment stories and a common vehicle pool.

9. Provide logistic, equipment and technical support as well as a high level of diving expertise to all field and shipboard surveys as resources permit.

10. Provide equipment and instrumentation to meet the research needs of agencies supported.

11. Maintain and repair current meters of the Water Survey of Canada and provide efficient calibration service.

12. Provide and apply engineering and scientific support required for environmental research studies of the private sector and other agencies.

13. Provide computer, computer programming and data base management support.

14. Provide administrative support in the areas of common services such as Personnel, Materiel Management, Finance, Library, CCIW Physical Plant, and Records Management.

| # | Title | Leader |
|---|---|---|
| 106 | Special Research Assignments | Egar |
| 318 | Applied Research and Engineering Studies | Dick |
| 330 | Laboratory Services | DeZeeuw |
| 350 | N.W.R.I. Engineering | Roy |
| 360 | MANTEC Support to NWRI Studies | Baird |

| # | Title | Leader |
|---|---|---|
| 361 | MANTEC Support to Non-NWRI Studies | Baird |
| 362 | Instrumentation Calibration Standards | Baird |
| 363 | Common User Test Equipment and Materiels Stores | Baird |
| 369 | Institute Equipment Manufacturing and Maintenance | Baird |
| 370 | Office Support Services | Hawkins |
| 371 | Office Support Services (Engineering) | Hawkins |
| 380 | Drafting Services to CCIW | Finn |
| 390 | Scientific Equipment Development | Ford |
| 512 | Circulation Within Great Lakes Coastal Zones | Boyce |
| 513 | Technology Transfer and Information Services | Bull |
| 571 | CCIW Data Archiving | Nagel |
| 572 | Water Quality Data Base Administration | Comba |
| 573 | EDP Support - Data Management | Hodson |
| 574 | Microcomputer Support | Beal |
| 621 | Media, Wash-up, Instrument and General Support | McInnis |
| 624 | Bacterial Toxicity Screening Symposium | Dutka |
| 670 | Computer Services for Water Management Research | Pulley |
| 803 | Open Lake Surveillance Support | Healey |
| 804 | Common User Equipment Maintenance and Acquisition | Taylor |
| 805 | Support to External Agencies | Macdonald |
| 806 | Limnological/Meterological Instrumentation Support | Diaz |
| 807 | Underwater Operations and Remote Areas Working Group | Taylor |
| 902 | Administration (DSS) | Findlay |
| 904 | Administration (Materiel Management) | Burton |
| 905 | Administration (Central Registry) | Rae |
| 906 | Administration (Finance) | Jagoe |
| 907 | CCIW Physical Plant | Stewart |
| 909 | Library | Dowie |

## B 4 National Water Research Institute

## GREAT LAKES WATER QUALITY AGREEMENT SUPPORT

### NATIONAL OBJECTIVES

1. "To resolve interjurisdictional water resource problems and realize interjurisdictional water resource opportunities in accordance with National interests."

2. "To plan, manage and control the policies, programs and activities of the Inland Waters Directorate in an effective and efficient manner."

### NWRI "Support to Great Lakes Water Quality Agreement" Program

Canada's unique federal system of government divides responsibility for water management between the two senior levels of government; and the international boundary with the United States is crossed by many water bodies. Since water respects no boundary, supply and demand conflicts can arise over its uses. Close liaison, diplomacy and co-operation are required between governments to ensure that each province and country receives a fair share of quality water. Long term trend information concerning water quality in the Great Lakes is essential to aid in the monitoring of trends, and the identification of problems and their sources. The Surveillance Program of NWRI provides data for the Water Quality Board Annual Report and information for the Science Advisory Board of the International Joint Commission (Great Lakes Water Quality Agreement). Microbiology support is provided to the IWD Water Quality Network. NWRI also provides computer, computer programming and data base management support of GLWQA programs as well ad administrative and financial management support.

The NWRI-GLWQA support program has the following main thrusts:

1. Conduct open-lake surveillance surveys on Lakes Ontario and Huron, and Bioindex surveys on Lakes Erie and Ontario for the GLWQA and GLWQP Surveillance Programs.

2. Provide technical and logistical support to all GLWQA field activities at CCIW.

3. Maintain state-of-the-art technology and its operation in sampling systems, for GLWQA work.

4. Provide computer, computer programming and data base services for the GLWQP at CCIW!

5. Assist the Water Quality Monitoring Program in their involvement with biological parameters by selecting suitable parameters and assessing their applicability in Canada-wide monitoring studies.

6. Complete the Lake Erie Trend Report.

7. Complete the Great Lakes Sediment Bank collection and cataloguing: prepare distribution policy.

8. Carry out statistical analysis of Lake Superior data and provide statistical criteria for sampling strategy.

9. Provide administrative support to the GLWQP in the areas of Personnel, Materiel Management, Finance, Library, etc.

| # | Title | Leader |
|---|---|---|
| 512 | Circulation Within Great Lakes Coastal Zones | Boyce |
| 513 | Technology Transfer and Information Services | Bull |
| 571 | CCIW Data Archiving | Nagel |
| 572 | Water Quality Data Base Administration | Comba |
| 670 | Computer Services for Water Management Research | Pulley |
| 802 | Logistical Support to NWRI, Field Equipment and Vehicles | Taylor |
| 803 | Open Lake Surveillance Support | Healey |
| 804 | Common User Equipment Maintenance and Acquisitions | Taylor |
| 805 | Support to External Agencies | Macdonald |
| 806 | Limnological/Meterological Instrumentation Support | Diaz |
| 807 | Underwater Operations and Remote Areas Working Group | Taylor |
| 902 | Administration (DSS) | Findlay |
| 904 | Administration (Materiel Management) | Burton |
| 905 | Administration (Central Registry) | Rae |
| 906 | Administration (Finance) | Jagoe |
| 907 | CCIW Physical Plant | Stewart |
| 909 | Library | Dowie |

## C. Individual NWRI Study Plans Organized by Division

# DIRECTOR'S OFFICE

## Director's Office

### Introduction

The National Water Research Institute (NWRI) of the Inland Waters Directorate is an environmental research organization at the Canada Centre for Inland Waters (CCIW) in Burlington, Ontario, and is part of the Department of the Environment.

The Institute carries out a program of research and development designed to meet the objective of providing the necessary information and understanding of water systems for water management problems or opportunities in Canada. Building on this program of research and development, it seeks to advance apply and disseminate scientific and engineering knowledge in the fields represented by the research programs. The work includes field and laboratory research on problems of natural or man-modified aquatic regimes and contracted research. Problems investigated are of national scope or are related to specific geographical sites referred by other agencies within or from outside the Department of the Environment. Also part of the total program is the provision of advice or information through publications, services on a consultative basis to other government agencies, service on scientific and technical committees of the government or government-supported institutions such as the International Joint Commission, and the provision of scientific services such as calibrations, analytical services, instrument testing, methodology documentation or interlaboratory quality control services.

Although the headquarters is at CCIW, detachments of NWRI are located in Winnipeg and Vancouver. Also, one senior staff member, Dr. P.G. Sly, has been assigned to the Glenora Research Station of the Ontario Ministry of Natural Resources and a unit working on the Long Range Transport of Airborne Pollutants is based at the GLFRB in Sault Ste. Marie, Ontario. There are many other temporary field sites occupied across Canada as the need arises.

### Senior Scientist

Dr. R.A. Vollenweider, the Institute's Senior Scientist, has continued to assist and advise scientists around the world on eutrophication research problems.

### WHO Collaborating Centre on Surface and Ground Water Quality

In October 1974, the Canada Centre for Inland Waters was designated by the World Health Organization as its Collaborating Centre on Surface and Ground Water Quality (WHO/CC). The main functions of the WHO/CC are (i) coordination of international technical assistance programs to the developing countries; and (ii) representation of Canada's freshwater interests in international forum.

## Pacific and Yukon Detachment

The Pacific and Yukon Detachment of NWRI conducts research in support of regional water management under the national program Water Management Research. The Branch's work is directed at understanding limnological processes in the unique lakes of the Pacific and Yukon Region, with the ultimate objectives of resolving conflicts of water use, determining the cause of environmental problems, and predicting the ecological response of regional lakes and reservoirs to any of a number of resource developments. Included in the resource development schemes are placer mine outwash, mine tailings dumping, interbasin transfers of water, hydro-electric dam construction and operation, recreational developments and upstream industrial and municipal waste discharges.

## Western and Northern Detachment

This NWRI Detachment was established to serve the research needs of Western and Northern region, a region which extends across the three prairie provinces and the Northwest Territories. The role of NWRI in this Region is to conduct both long-term strategic research for the Department in the general field of water quality management, and short-term tactical research in support of specific operational requirements of a variety of clients.

Historically this group has focussed on practical problems such as mercury contamination of the English-Wabigoon system. More recently it has addressed similar problems in certain Northern Manitoba hydro reservoirs as well as other management concerns such as: restoration issues of the Qu'Appelle River lakes involving eutrophication and toxic substances, the physical processes of nutrient regeneration by bottom resuspension of sediments from selected prairie lakes, and the long distance pathways and ecotoxicology of toxic substances in prairie rivers. Beyond practical problem-solving, this unit provides advice and guidance to IWD in particular and to the Department in general in the planning and execution of water management in the prairie provinces and the Northwest Territories.

# STUDIES FOR THE DIRECTORS OFFICE

85/05/31.

| SECTION | STUDY | STUDY TITLE | STUDY LEADER |
|---|---|---|---|
| BRANCH | | | |
| | 101 | NWRI BRANCH MANAGEMENT AND ADMINISTRATION | EGAR,D.L. |
| | 130 | INFORMATION TECHNOLOGY COMMITTEE | DUFFIELD,R.A. |
| | 131 | EMPLOYEE ASSISTANCE PROGRAM | EGAR,D.L. |
| | 150 | REGIONAL PERSONNEL PROGRAM | NAMETH,S.G. |
| RESEARCH | | | |
| | 102 | EUTROPHICATION | VOLLENWEIDER,R.A. |
| | 106 | SPECIAL RESEARCH ASSIGNMENTS | EGAR,D.L. |
| | 109 | HABITAT STUDIES | SLY,P.G. |
| | 110 | LIMNOLOGICAL EFFECTS OF WATER LEVEL CHANGES | SLY,P.G. |
| | 120 | COORDINATION OF IWD LRTAP PROGRAM | ELDER,F.C. |
| | 140 | UPPER GREAT LAKES CHANNEL STUDY - COORDINATION | RODGERS,G.K. |
| | 141 | THERMAL REGIME OF CANADIAN WATERS | RODGERS,G.K. |
| WORLD HEALTH ORGANIZATION COLL. CENTRE | | | |
| | 103 | WHO COLLABORATING CENTRE ON SURFACE AND GROUND WATER QUALITY | BARABAS,S. |
| PACIFIC AND YUKON REGION | | | |
| | 161 | P&Y PROGRAM MANAGEMENT AND SCIENTIFIC ADVICE | PHARO,C.H. |
| | 162 | THOMPSON RIVER ALGAL ECOLOGY | BOTHWELL,M.L. |
| | 163 | NORTHERN HYDRO LIMNOLOGY | CARMACK,E.C. |
| WESTERN AND NORTHERN REGION | | | |
| | 170 | PROGRAM MANAGEMENT AND TECHNOLOGY TRANSFER | ONGLEY,E.D. |
| | 174 | BIOAVAILABILITY OF HEAVY METALS IN NORTHERN AQUATIC SYSTEMS | JACKSON,T.A. |
| | 176 | APPLICATIONS IN PRAIRIE LAKE PHYSICS | KENNEY,B.C. |
| | 180 | EFFECTS ASSESSMENT TECHNIQUES USING BENTHIC COMMUNITIES | WARWICK,W. |
| | 183 | CONTAMINANT PATHWAYS IN PRAIRIE AND NORTHERN RIVERS | ONGLEY,E.D. |

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PROCESSING FORMB FOR DIVISION NWRI                         DATE RUN  85/05/23.

   ----ORGANIZATION---- --ENGINEERING---- -----MANTEC------ ---TECH OPS.--- --DM-- ------EXTERNAL---- SHADOW ----------TOTALS----------
 NO  PY SAL   OM   CAP  PY SAL   OM  CAP  PY SAL   OM  CAP  PY SAL   OM OT PY SAL AG PY SAL   OM  CAP COST   PY SAL    OM   CAP   COST
101 2.0  88 111.0   --  -- --    --   --  -- --    --   --  -- --    -- -- .10  3    -- --    --   --   --  2.10  91 111.0    --  202.2
102 1.0  65  20.0  3.0  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --   --  1.00  66  20.0   3.0   89.0
103 2.0  80  30.0   --  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --   --  2.00  80  30.0    --  110.0
106  -- --    --  39.0  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --   --    --  --    --  39.0   39.0
109  .5  30  21.0 15.0  -- --    --   --  .20  7   --   --  .25  8 13.0  2 -- --    -- --    --   --
109                                                                    SHADOW OFO          VESSEL     .5   .95  46  34.0  15.0   95.3
110  .5  30   6.0   --  -- --    --   --  -- --    --   --  -- --    -- -- .25  8    -- --    --   --   --   .75  38   6.0    --   44.3
120  .5  11    --   --  -- --    --   --  -- --    --   --  -- --    -- -- -- --LRT1.00 79332.0  7.5        1.50  96 332.0   7.5  429.5
130  -- --    --    --  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --   --    --  --    --    --     --
131  -- --    --    --  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --   --    --  --    --    --     --
140  .5  30  10.0   --  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --   --   .50  30  10.0    --   40.3
141  .5  30  10.0 15.0  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --   --   .50  30  10.0  15.0   55.0
150 7.0 204  19.9   --  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --   --  7.00 204  19.9    --  223.3
161 3.0 117 119.7 90.0  -- --    --   --  -- --    --   --  .02  1   -- -- -- --    -- --    --   --   --  3.02 118 119.7  90.0  327.7
162 4.0 157 104.8   --  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --   --  4.00 157 104.8    --  261.3
163 4.5 176  78.5   --  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --   --  4.50 176  78.5    --  254.6
170  .7  33  80.0  5.6  -- --    --   --  -- --    --   --  .07  2   -- -- -- --    -- --    --   --
170                                                                    SHADOW NHRI                   10.0   .77  35  80.0   5.6  130.9
174 1.5  67  22.2 10.4  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --   --  1.50  67  22.2  10.4  100.0
176 1.8  77  12.0  3.5  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --   --  1.80  77  12.0   3.5   92.0
180 1.8  75  13.0   --  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --   --  1.80  75  13.0    --   87.7
183 1.2  56  11.4  5.5  -- --    --   --  -- --    --   --  -- --    -- -- -- --    -- --    --   --
183                                                                    SHADOW IWOWAN                 20.0  1.20  56  11.4   5.5   92.6

  33.00   669.5          --        --      .20     --       .34   13.0  .35    1.00  332.0     30.5     1436       134.5
      1326      187.0       --        --        7       --      10     2.     12       79      7.5   34.89   1014.5        2675.5
```

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 101

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | NWRI Branch Management and Administration | DIVISION NWRI<br>SECTION BRANCH |
| KEY WORDS/ MOTS CLEFS | MANAGEMENT, ADMINISTRATION, BUDGETS, PLANNING, IJC | PAE EAP 1611 |
| STUDY LEADER/ CHEF D'ETUDE | Egar, D.L.<br>TEL: 637-4625 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>NWRI |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | M. Stapleton, NWRI Administration & Programs Management Team, Receptionist | |
| TIME FRAME/ CALENDRIER | START DEBUT<br>FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. Improve effectiveness through IMPAC.
   a) Develop more quantitative project planning beyond one fiscal year.
   b) Prepare NWRI input to ECS planning process.
2. To achieve NWRI targets for affirmative action plans.
3. To enhance NWRI's "national" image, provide leadership in water research and anticipate (and research for) future problems.
4. To improve Human Resources Management in NWRI.
5. Improve interaction between operations and research activities.
6. Facilitate new NWRI 'Regions' reporting to Director, NWRI.

## Performance Indicators/Indicateurs de rendement

1. a) Long Term Operational Plans.
   b) As required.
2. Targets as defined in HQ memorandum.
3. Completion of NWRI Strategy Plan and meeting of NWRI Management Team - Programs (3-4 times/year). Co-chairman of IJC Council of Great Lakes Research Managers.
4. Formulate complete Training and development program. Review Employee Assistance Program.
5. Continue to respond to the research needs of the Department and IWD Operational Branches and Regions. Research review visit to IWD Quebec and Atlantic regions.
6. Prepare a management process to incorporate line management responsibilities and programs for NWRI W&N and P&Y regions.

## Relevance/Objet

To promote efficiency, effectiveness and economy in the management of NWRI's water research and support services.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 102

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Eutrophication | | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | EUTROPHICATION, LIMNOLOGY, INTERNATIONAL RELATIONS, | | SECTION RESRCH<br>PAE EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Vollenweider, R.A. | TEL: 637-4242 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | | |
| TIME FRAME/ CALENDRIER | START DEBUT<br>FINISH FIN Ongoing | | NWRI - |
| PRIMARY USER/ USAGER PRIMAIRE | | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | D. Haffner, WQB - HQ | TEL: 997-3422 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Publication of a large comparative study of C, N, P and Chlorophyll in lake, reservoir and marine aquatic environments.
2. Trophic conditions in warm climate reservoirs in relative to temperate lakes.
3. Advice on Eutrophication Issue and phosphorus control study for the GLWQ Program.
4. Advice generally, as consultant for Departmental, national, GEMS/UNEP, WHO, and other concerns that arise.
5. Advice to Director, NWRI on science and research programs of the Institute.

Performance Indicators/Indicateurs de rendement

1/2 Complete publications.
3. Participation in Director's Review.
4. Response as agreed and degree of satisfaction of clients.
5. Service to Branch.

Relevance/Objet

Provides Canadian participation and leadership in international activities. Provides development of new techniques for addressing the eutrophication issue as it affects lakes and reservoirs.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 103

| | |
|---|---|
| STUDY TITLE/<br>TITRE D'ETUDE | WHO Collaborating Centre on Surface and Ground Water Quality |
| KEY WORDS/<br>MOTS CLEFS | WATER QUALITY, DATA COLLECTION, DATA QUALITY, GROUNDWATER, INTERNATIONAL RELATIONS, GLOBAL ENVIRONMENTAL MONITORING SYSTEM |
| STUDY LEADER/<br>CHEF D'ETUDE | Barabas, S. TEL: 637-4309 |
| TEAM MEMBERS/<br>MEMBRES D'EQUIPE | S. Ponton, R. Duffield, Water Quality Bulletin Editorial Board |
| TIME FRAME/<br>CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 |
| PRIMARY USER/<br>USAGER PRIMAIRE | TEL: |
| IWD/DGEI CONTACT | TEL: |

DIVISION NWRI

SECTION WHO/CC

PAE EAP 1170

SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE
WHO -

OTHER USERS/ AUTRES USAGERS

INTEREST/INTERET DIRECT-GENERAL

## Goal/But

1. Publication of quarterly journal WATER QUALITY BULLETIN
2. Publication du journal trimestre BULLETIN DE LA QUALITE DES EAUX
3. Arrange visits for foreign visitors to NWRI and consultancies abroad
4. GEMS data bank development, maintenance and reporting.
5. Training in GEMS/WATER operations and manual documentation.

## Performance Indicators/Indicateurs de rendement

1. Volume 10, Numbers 2 (April 85); 3 (July 85); 4 (October 85); and Volume 11, Number 1 (January 86).
2. Volume 10, Nos. 2 (juin 85); 3 (septembre 85); 4 (décembre 85); et Volume 11, No. 1 (mars 86).
3. As required.

4/5 Continuing function subject to review of Program by the international committees and the WHO office who serves as the UNEP administrator.

## Justification

Canada's commitment to the World Health Organization to assume the responsibilities inherent in the designation of the National Water Research Institute as the WHO Collaborating Centre on Surface and Ground Water Quality. Such responsibilities comprise coordination of international programs aimed at preserving and/or restoring the quality of major surface and ground water bodies.

Canadian commitment, through DOE, to the Global Environmental Monitoring Program (UNEP, GEMS/WATER).

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 106

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Special Research Assignments | DIVISION NWRI |
| | | SECTION RESRCH |
| KEY WORDS/ MOTS CLEFS | REGIONS, SPECIAL PROJECTS | PAE EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Egar, D.L. TEL: 637-4625 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>-<br>NWRI |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1981 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | - TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To provide incidental support for regional programs and for any NWRI deserving new initiatives that arise during the fiscal year.

Performance Indicators/Indicateurs de rendement

Support to regional programs and new initiatives.

Relevance/Objet

To provide support for unanticipated needs without disrupting the allocations already made.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-109

| | |
|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Habitat Studies |
| KEY WORDS/ MOTS CLEFS | GREAT LAKES, HABITAT, REHABILITATION |
| STUDY LEADER/ CHEF D'ETUDE | Sly, P.G. TEL: 613-476-6556 |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | |
| TIME FRAME/ CALENDRIER | START DEBUT April'85 FINISH FIN March'86 |
| PRIMARY USER/ USAGER PRIMAIRE | IWD TEL: |
| | IJC, GLFC, OMNR, USF&W, US State Agencies |
| IWD/DGEI CONTACT | T. Moenig, WP&M-HQ TEL: 997-2639 |

| | |
|---|---|
| DIVISION | NWRI |
| SECTION | RESRCH |
| PAE EAP | 1514 |
| SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE | Cooperative OMNR & NYDEC |
| OTHER USERS/ AUTRES USAGERS | |
| INTEREST/INTERET DIRECT-GENERAL | As primary |

Goal/But

1) To determine the habitat parameters which appear to characterize successful spawning sites.
2) To determine factors which appear to have degraded historic site of lake trout spawning.

Performance Indicators/Indicateurs de rendement

1) De-briefing report following NOAA submersible dive, plus preparation of jointly authored paper if study yields sufficient information.
Topics above.

Relevance/Objet

IJC - Great Lakes water quality, GLFC/IJC lake rehabilitation, IWD - Water management research.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 110

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Limnological Effects of Water Level Changes | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | LAKES, RESERVOIRS, AQUATIC ENVIRONMENTS, BIOTA | SECTION RESRCH<br>PAE EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Sly, P.G. TEL: 613-476-6556 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>Cooperative OMNR & USF&W |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT April'85 FINISH FIN March'87 | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS OMNR & USF&W |
| IWD/DGEI CONTACT | WP&M, Ontario Region (D.R. Cuthbert TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1) To use different physical factors to improve the Morphoedaphic Index (MEI) as a means of characterizing potential fish production.
2) To apply the revised index to Lake Ontario, as an example lake, to show the significance of water level changes on potential fish production. The water level changes would include: i) normal variations which are experienced under the present regulatory scheme and ii) changes which might occur as a result of different management stratagies.
3) To characterize sub-components of the Lake Ontario habitat which might be manipulated to enhance desirable fish communities.
4) To integrate some characteristic of nutrient chemistry, (possible total-P) as a further refinement of the Morphoedaphic Index.

Performance Indicators/Indicateurs de rendement

1) Preliminary assessment of means to refine climatic and limnological data, late 1985.
2) Report to Lake Ontario Working Group (GLFC) on proposed classification of Lake Ontario aquatic habitat, March/April 1986.
3) Workshop on aquatic habitat assessment (late 1986), details for presentation to GLFC/IJC under discussion with USF&W.

Relevance/Objet

GLFC/IJC - Lake Rehabilitation, IJC - Water Level Regulation
IWD/WP&M - Water Management (level regulation) research.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

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|---|---|---|---|
| | | | NO: 85- 120 |
| STUDY TITLE/ TITRE D'ETUDE | Coordination of IWD LRTAP Program | | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | ACID RAIN, LRTAP, COORDINATION | | SECTION RESRCH |
| | | | PAE EAP 4200 |
| STUDY LEADER/ CHEF D'ETUDE | Elder, F.C. | TEL: 637-4212 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | IWD Mangers in the LRTAP Program, NWRI NHRI, IWD Regional Directors | | |
| TIME FRAME/ CALENDRIER | START DEBUT 1979 FINISH FIN 1989 | | LTRAP |
| PRIMARY USER/ USAGER PRIMAIRE | LRTAP Liaison Office | TEL: 667-4803 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | Director General, IWD | TEL: 997-2019 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To plan, coordinate and evaluate the IWD LRTAP program under the framework of the DOE and ECS LRTAP programs according to the Departmental schedules.
2. To represent IWD on the ECS, DOE and Interdepartmental LRTAP committee and work groups and represent Canadian aquatic programs on the ECE LRTAP Convention when required at the request of the DG or ADM.
3. To provide for information flow from the IWD program to national and international bodies and organize an International Symposium in 1985.

Performance Indicators/Indicateurs de rendement

1. (a) The IWD Long Term Operational Plan for LRTAP to be updated in November 1985.
   (b) The IWD LRTAP Work Plan for FY 85-86 to be completed by February 1986.
   (c) Program evaluation and status reports to be completed and submitted to the DG at six month intervals.
2. (a) IWD to be represented on the Interdepartmental LRTAP Committee as scheduled and on the Departmental LRTAP Steering Committee as required.
   (b) As Federal Co-Chairman of the RMCC Aquatic Effects work group, work group meetings and program reports at least semi-annually.
   (c) Serve as Chairman and represent Canada on the ECE, LRTAP Aquatic Effects Commission and provide program leadership to the Canada Norway Project, RAIN.
3. (a) IWD Research reports produced on schedule and circulated to the national and international user bodies. Briefing notes and position papers produced as appropriate or required.
   (b) The program for the International Symposium on Acid Precipitation completed by May 1985 and the symposium conduced as scheduled in September 1985.

Relevance/Objet

The LRTAP program is a priority of the Department. Efficient planning and coordination of the IWD portion of this Integrated Program is essential to the Aquatic Effects definition of the LRTAP Issue.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

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|---|---|---|
| | | NO: 85- 130 |
| STUDY TITLE/ TITRE D'ETUDE | Information Technology Committee | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | COMPUTER, OFFICE AUTOMATION, INFO/TECH | SECTION BRANCH<br>PAE EAP 1620 |
| STUDY LEADER/ CHEF D'ETUDE | Duffield, R.A. TEL: 637-4324 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>NWRI - |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | S. Beal, C. Kennedy, H.C. Pulley | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | D. Farley, WP&M - HQ/Chairman, IWD INFO/TECH Committee TEL: 997-2604 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | D. Egar, Director, NWRI TEL: 637-4625 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. The study leader will serve as the interface between NWRI and and the IWD INFO/TECH Committee.
2. To provide advice to NWRI management with regard to INFO/TECH policy development, computer communications, hardware and software procurement.
3. To facilitate communications between the various components within NWRI and among other units of CCIW.
4. To assist NWRI management towards developing a long-term INFO/TECH plan defining resources required for allocation by management.
5. To review, when requested, requests for purchase or rental of computer equipment within NWRI.

Performance Indicators/Indicateurs de rendement

1. Reports on various information technology areas will be written as the need arises.
2. An information technology plan will be formulated for the new P&Y and W&N Detachments of NWRI which will be located at the new NHRI.
3. Members of the committee will provide information regarding computer communication needs to GTA in regards to the replacement of CCIW's current PBX.

Relevance/Objet

This study is required for future and current planning purposes and coordination with Departmental initiatives in the information technology areas. It will provide for efficient and economical use of technology within NWRI.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 131

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Employee Assistance Program | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | HUMAN RESOURCE MANAGEMENT | SECTION BRANCH<br>PAE EAP 1670 |
| STUDY LEADER/ CHEF D'ETUDE | Egar, D.L. TEL: 637-4625 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>NWRI |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | N. Harper (Referral Agent), DOE Personnel and the DOE/CCIW EAP Committee | |
| TIME FRAME/ CALENDRIER | START DEBUT 1980 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To maintain referral agent availability for all DOE staff.
2. To maintain the visibility of the program through advertising and supervisor training.

Performance Indicators/Indicateurs de rendement

1. Maintenance of referral agent availability (one in NWRI).
2. Review of Program to be completed by the Committee in light of experience and development in management/union discussion at senior levels (collaboration with DFO - December 1983; DOE Director's agreed on approach; possible collaboration with other Federal government departments - newly organized program fully operational by 1 September).
3. Evidence of its effectiveness - number of consultations, and the percentage of these resolved (quarterly statistics).
4. Degree to which policy requirements are met.
5. NWRI requesting audit prior to new program implementation.

Relevance/Objet

Required under Departmental Policy and Directives on Human Resource Management.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85-140

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Upper Great Lakes Channel Study - Coordination | | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | GREAT LAKES, LAKE ST. CLAIR, DETROIT RIVER, ST. CLAIR RIVER, WATER QUALITY | | SECTION RESRCH<br>PAE EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Rodgers, G.K. | TEL· 637-4288 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | NWRI Study Leaders with related projects | | |
| TIME FRAME/ CALENDRIER | START DEBUT 1985 FINISH FIN 1988 | | |
| PRIMARY USER/ USAGER PRIMAIRE | R. Shimizu, Canadian Co-Chairman UGLCCS Management Committee | TEL: 416-966-8633 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | D. Egar, NWRI member of UGLCCS Management Committee | TEL: 416-637-4625 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

An integrated NWRI Program for the Upper Great Lakes Connecting Channel Study (UGLCCS) with results useful for the final report in 1987.

## Performance Indicators/Indicateurs de rendement

1. Detailed NWRI FY 85/86 Program Submission to RDG's office by May 1985, relating clearly to the UGLCCS Work Plan.
2. Effective participation in Activity Integration Committee of the UGLCCS in FY 85/86.
3. Timely advice to Director, NWRI on collaboration and management matters related to the Program.
4. Preparation of at least two reports on the program in FY 85/86.

## Relevance/Objet

This is a response to a DOE/EPA agreement, with support from Ontario and Michigan, to collaborate in a thorough examination of the water quality situation in these connecting Channels of the Great Lakes.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85-141

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Thermal Regime of Canadian Waters | | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | TEMPERATURE, LAKES, RIVERS, GROUNDWATER | | SECTION RESRCH<br>PAE EAP 1512 |
| STUDY LEADER/ CHEF D'ETUDE | Rodgers, G.K. | TEL: 637-4288 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | | |
| TIME FRAME/ CALENDRIER | START DEBUT 1985 | FINISH FIN 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | TBA | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TBA | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

A review of research and data pertinent to the thermal regime of Canadian lakes, rivers and groundwaters.

## Performance Indicators/Indicateurs de rendement

A review paper on one or more aspects of this primary density factor in water, in relation to potential atlas applications, trend analysis, causative factors and influence on serial water quality data.

## Relevance/Objet

Relevance to water supply, and to water quality both in terms of water use, environmental effects and influence on water quality parameters.

## Other Related Activities

Conference Session Convener: Canadian Waters, May 1985, Toronto
Vice-chairman, Council of Great Lakes Research Managers
Great Lake Water Quality Program Element Review

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Study Plan
Plan d'étude

NO: 85-150

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Regional Personnel Program | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | HUMAN RESOURCES (PERSONNEL) MANAGEMENT, CLASSIFICATION, COMPENSATION, STAFFING, PLANNING, TRAINING, STAFF RELATIONS, HEALTH & SAFETY, EMPLOYEE ASSISTANCE PROGRAM | SECTION BRANCH<br>PAE EAP 1680 |
| STUDY LEADER/ CHEF D'ETUDE | Nameth, S.G. TEL: 637-4591 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | S.C. Pettit, K.A. Mawbey, B.J. Wydryk, D. O'Hagen, S. St. Laurent, C. Desjardins, R. Young (T), M. Gaskin (T) | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | ECS Management & Staff<br>EPS-WTC Management & Staff TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To plan, develop, organize and deliver a comprehensive human resources management program providing delegated personnel services (including Classification, Compensation, Staffing, Human Resources Planning, Training, Staff Relations, Health & Safety, Employee Assistance Program) for all DOE components headquarters at CCIW.

## Performance Indicators/Indicateurs de rendement (reference Work Plan)

1. Personnel Program workplan established and integrated with clients' workplans.
2. Human Resources Planning and Centralized ECS/EPS Training Plan established and integrated with clients' management planning process.
3. Provision of optimum personnel services on a day-to-day basis.
4. Special Program Reviews:
   - 4(i) Establishment with management of a mechanism to address affirmative action issues.
   - 4(ii) Employee Health & Safety Monitoring Program review completed, management advised of findings, and program modified accordingly.
   - 4(iii) Employee Assistance Program established, reviewed and monitored with management advised of status and recommendations.

## Relevance/Objet

To ensure optimum management and utilization of local departmental human resources and that all aspects of personnel legislation and regulations and associated central agency and departmental policies are respected.

FORM A, PART 1/FORMULE A, PARTIE 1

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-161

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | P&Y Program Management and Scientific Advice | | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | BRITISH COLUMBIA, MANAGEMENT, ADMINISTRATION, LIMNOLOGY, TECHNOLOGY TRANSFER | | SECTION PY/RGN<br>PAE EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Pharo, C.H. | TEL: 922-6912 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | S. Roberts, R.J. Daley, C.B. Gray<br>M.L. Bothwell, E.C. Carmack | | |
| TIME FRAME/ CALENDRIER | START DEBUT<br>FINISH FIN Ongoing | | |
| PRIMARY USER/ USAGER PRIMAIRE | D.L. Egar, Director, NWRI<br>RD - P&YR, IWD | TEL: 637-4625 | OTHER USERS/ AUTRES USAGERS 2 |
| IWD/DGEI CONTACT | D.L. Egar, Director, NWRI<br>E.M. Clark, Reg. Dir., P&YR | TEL: 637-4625<br>666-3357 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To plan, organize, manage and control the scientific and administrative program of the Pacific and Yukon Regional Branch, NWRI, and to provide regional DOE management and external users with limnological and estuarine management advice, as required.

Performance Indicators/Indicateurs de rendement

1. Successful completion of the strategic work plan for the Branch on time and within budget.
2. Timely completion of stragtegic and long term work plans, study plans, appraisal and promotion documents and training plans.
3. Coordinate with NWRI-W&NR on planning for April 1986 relocation to NHRC-Saskatoon.
4. Timely response, as requested to EARP and EPS assessment referrals, to technical requests from B.C. MOE, EPS, DFO, etc., to journal and grant reviews, and to subvention and unsolicited proposals.
5. Provision of limnological information (3 journal papers) and advice on the feasibility of nutrient fertilization (joint public report) to Kootenay Lake, B.C. to Fisheries Branch, B.C. MOE, by January 1985.
6. Written summary of priority research needs for the lower Fraser River and estuary and of feasible NWRI research responses by March 1986.

Relevance/Objet

To promote efficiency, economy and effectiveness in the conduct of P&Y branch research and provision of regional water management advice.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude.

NO: 85- 162

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Thompson River Algal Ecology | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | ALGAE, NUTRIENTS, ECOLOGY, EUTROPHICATION, MICROBIOLOGY, PHOSPHORUS | SECTION PY/RGN<br>PAE EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Bothwell, M.L. TEL: 926-0811 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | S. Jasper, K. Suzuki, R. Daley, C. Gray, V. Chamberlain, R. Kirkland | |
| TIME FRAME/ CALENDRIER | START DEBUT March 1982 FINISH FIN March 1986 | Weyerhaeuser Canada Ltd. |
| PRIMARY USER/ USAGER PRIMAIRE | Weyerhaeuser Canada Ltd. TEL: 372-2217 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | T. Tuomianan, WQB TEL: 980-6915 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

By 1986, an operational flowing-trough technology for assessing river eutrophication and, through its use, predictive understanding for annual phosphorus-algal growth relationships in the Thompson River, B.C.

## Performance Indicators/Indicateurs de rendement

1. Completion of four experiments on the efficiency of nutrient pluse usage by periphyton.
2. An assessment of the relative availability of various organic-P compounds to river periphyton.
3. Completion of 2-3 experiments on the influence of pulp mill effluent on algal growth rates.
4. Data reduction for four-year project completed.
5. Prepare completion report for Weyerhaeuser Canada Ltd. by April 1986.
6. Complete one journal paper by January 1986.

## Relevance/Objet

1. Results of this work will help establishment of water quality objectives for nutrients in rivers.
2. Results will be used by EPS and regulatory agencies in setting guidelines for nutrient discharges to rivers.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

| | |
|---|---|
| NO: 85- | 163 |
| DIVISION | NWRI |
| SECTION | PY/RGN |
| PAE<br>EAP | 1514 |
| SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE | |
| OTHER USERS/ AUTRES USAGERS | 3 |
| INTEREST/INTERET | DIRECT-GENERAL |

| | |
|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Northern Hydro Limnology |
| KEY WORDS/ MOTS CLEFS | NORTH, YUKON, HYDRO DEVELOPMENTS, NORTHERN LIMNOLOGY, SUSPENDED SEDIMENTS, BRITISH COLUMBIA |
| STUDY LEADER/ CHEF D'ETUDE | Carmack, E.C. TEL: 926-2014 |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | C. Pharo, C.B. Gray, R. Kirkland, S. Jasper, R. Wiegand, V. Chamberlain, E. Marles |
| TIME FRAME/ CALENDRIER | START DEBUT April 1981 FINISH FIN March 1987 |
| PRIMARY USER/ USAGER PRIMAIRE | E.M. Clark, RD, IWD P&Y TEL: 666-3357 |
| IWD/DGEI CONTACT | E.M. Clark, RD, IWD P&Y TEL: 666-3357 |

Goal/But

Predictive understanding of the ecological sensitivity of northern lakes and rivers to hydroelectric development obtained by studies of important environmental processes in lakes and rivers in the Yukon drainage basin.

Performance Indicators/Indicateurs de rendement

1. Install remote recording instrumentation (MET, CMT, FTP, TRS) at the Slims River delta of Kluane Lake in April and carry out field study (SEDEX) of sediment entrainment and deposition in July/August 1985.
2. Prepare a journal manuscript on "Dynamics of Ice-covered Riverine Lakes" and a report on "Observations of an Ice Jam on the Yukon River near Fort Selkirk" and a manuscript "On Spatial Structure of Temperature and Turbidity in Lake Laberge" by March 1986.
3. Carry out a follow-up study of the phytoplankton bloom under the ice of Lake Laberge in April/May 1985.
4. Prepare a management report on the implications of the previous reconnaissance limnological data interpretation on the water management in the Yukon with respect to sewage treatment/plant effluent standards especially at Whitehorse, by March 1986.

Relevance/Objet

Northern B.C. and the Yukon have enormous long-term hydroelectric potential. However, almost nothing is known about the limnology of the large ice-covered lakes of the region. This project is in response to the ECS priority for research into the impacts of hydroelectric development in northern areas.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 170

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Program Management and Technology Transfer | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | MANAGEMENT, TECHNOLOGY TRANSFER, BUDGET | SECTION WN/RGN<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Ongley, E.D. TEL: 949-5040 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Provide leadership in work plan execution, strategic and long-term research planning, branch administration and public information activities.
2. Provide advice and leadership to inter-agency programs, and on application of scientific knowledge to operational concerns.
3. Provide facilities planning and program planning for relocation to Saskatoon.

Performance Indicators/Indicateurs de rendement

1. Complete LTOP, work planning and resources allocations for the regional NWRI program; control branch budget and carry out personnel functions such as staffing, appraisals, etc.
2. Manage Saskatchewan River Basin program on behalf of IWD-W&NR.
3. Conduct periodic reivews of research needs in W&N Region; maintain close liaison with other federal/provincial/territorial agencies; carry out reviews of external studies, research proposals and journal papers, and act as scientific liaison to other programs such as the WRRSP program.
4. Maintain central facilities, such as computing and word processing facilities.
5. Participate in Regional Management Committee, NWRI Management Committee, Regional Pesticides Committee and other committees as required.
6. Provide appropriate advice for program planning for the NWRI-Western Division, and ensure timely technical input for facilities planning for NHRC.
7. Carry out liaison with provincial governments in connection with NWRI national or regional programs.

Relevance/Objet

To ensure continuity and relevance of NWRI research programs.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 174

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Bioavailability of Heavy Metals in Northern Aquatic Systems | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | HEAVY METALS, BIOAVAILABILITY, BIOACCUMULATION, TOXICITY, WATER QUALITY, BIOGEOCHEMISTRY, NORTH | SECTION WN/RGN<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Jackson, T.A. TEL: 949-5036 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>TCMP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | E.D. Ongley, K. Supeene, J. Tisdale | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | IWD-Western & Northern Region TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

Develop improved criteria for assessing ecologically-meaningful forms of various heavy metals for improved water quality management of northern aquatic systems.

## Performance Indicators/Indicateurs de rendement

1. By August 31, 1985, complete a literature review and write in-house report on metal species, bioavailability, and bioaccumulation, with particular emphasis on impact assessment techniques for metals in northern aquatic systems. This report will be submitted for publication by March 31, 1986.
2. Carry out, by March 31, 1986, an experimental program in conjunction with Study #183 to determine the utility of chemical fractionation techniques on water and sediment-associated metals as an ecologically relevant procedure.
3. Write and submit for publication by March 31, 1986, two papers on the biogeochemistry of mercury in relation to management of mercury-stressed aquatic systems in western and northern Canada.

## Relevance/Objet

Research required to meet water management objectives in western and northern Canada in response to client requirements. This work is also identified under Departmental northern priorities, and the Environmental Sensing Strategy of the Toxic Chemicals Management Program.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85-176

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Applications in Prairie Lake Physics | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | AQUATIC PHYSICS, DATA MANAGEMENT, MODELS, NORTH, ICE, PHYSICAL LIMNOLOGY, PRAIRIES, MANITOBA, SASKATCHEWAN | SECTION WN/RGN<br>PAE EAP 1512 |
| STUDY LEADER/ CHEF D'ETUDE | Kenney, B.C. TEL: 949-5034 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J. Mollison | |
| TIME FRAME/ CALENDRIER | START DEBUT Jan. 1982 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | Mr. R. Halliday, W&NR TEL: 359-5319 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

The application of recent theoretical and empirical advances in lake physics to lake management issues in the Western and Northern Region.

## Performance Indicators/Indicateurs de rendement

1. Evaluate riverine and lake circulation model requirements of clients in the NWT and prepare a report indicating needs and future direction of physical limnology research in the NWT, by September 30, 1985.
2. Synthesize Lake Manitoba data and submit for publication a report on mixing and entrainment characteristics in large shallow prairie lakes, by August 31, 1985.
3. Develop a handbook on the application of phosphorus dynamics concepts for practical lake management purposes on the Canadian prairies, by Dec. 31, 1985.
4. Synthesize existing data base for Rock Lake and submit for publication a report on the physical limnology of riverine lakes on the Canadian prairies, by March 31, 1986.

## Relevance/Objet

Research required to meet water management objectives on the Canadian prairies in response to client requirements.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

| | |
|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Effects Assessment Techniques Using Benthic Communities |
| KEY WORDS/ MOTS CLEFS | BENTHOS, CONTAMINANTS, NUTRIENTS, TOXICITY, WATER QUALITY, SEDIMENTS, SASKATCHEWAN, PALEOLIMNOLOGY |
| STUDY LEADER/ CHEF D'ETUDE | Warwick, W. TEL: 949-5038 |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | C. Casey |
| TIME FRAME/ CALENDRIER | START DEBUT April 1982 FINISH FIN March 1986 |
| PRIMARY USER/ USAGER PRIMAIRE | Dr. H. Vaughan, W&NR TEL: 359-5322 |
| IWD/DGEI CONTACT | TEL: |

| | |
|---|---|
| NO: 85- | 180 |
| DIVISION | NWRI |
| SECTION | WN/RGN |
| PAE EAP | 4100 |
| SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE | TCMP |
| OTHER USERS/ AUTRES USAGERS | |
| INTEREST/INTERET DIRECT-GENERAL | |

## Goal/But

To identify and quantify the effect of nutrient and contaminant stress upon benthic organisms living in contemporary and historic sediments of representative stressed lacustrine ecosystems of western Canada, for the purpose of developing practical stress-evaluation techniques.

## Performance Indicators/Indicateurs de rendement

1. Submit for publication the following manuscripts:
   - morphological deformities in Chironomidae, by June 30, 1985.
   - massive deformities in Chironomidae, by November 30, 1985.
2. Participate in invitational IJC workshop, by June 30, 1985.
3. Submit final report on Mercury Accumulation by Benthic Invertebrates in Northern Manitoba Reservoirs by July 31, 1985.
4. Evaluate the chemistry, bioassay and chironomid deformities at Tobin Lake Sites 2, 5, 9, 13, 17 and Last Mountain Lake, in preparation for publication of materials pertaining to in-situ ecotoxicological assessment by March 31, 1985.
5. Continue examination of structural characteristics of chironomid fauna Tobin Lake Sites 2, 5, 9, 13, 17 with the objective of publishing this material in FY 86/87.

## Relevance/Objet

Research in support of toxic chemicals priorities variously identified in Departmental and Directorate Strategic Plans, in Environmental Sensing Strategy of the Toxic Chemicals Management Program, and the Saskatchewan Basin Issue under the TCMP program.

| | | |
|---|---|---|
| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | Study Plan<br>Plan d'étude | NO: 85-183 |
| STUDY TITLE/ TITRE D'ETUDE | Contaminant Pathways in Prairie and Northern Rivers | DIVISION NWRI |
| KEY WORDS/ MOTS CLEFS | CONTAMINANTS, HEAVY METALS, HYDROCARBONS, SEDIMENTS, WATER QUALITY, PATHWAYS, BIOGEOCHEMISTRY | SECTION WN/RGN<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Ongley, E.D. TEL: 949-5040 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>TCMP<br>NOGAP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | T.A. Jackson, K. Supeene, J. Tisdale, J. Mollison | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | Mr. R. Hale, IWD-NWT Programs TEL: 920-8500 | OTHER USERS/ AUTRES USAGERS<br>2 |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To develop improved monitoring practices for practical assessments of aquatic pathways, fate and ecological relevance of metals, hydrocarbons, and agricultural chemicals in respresentative prairie and northern rivers.

## Performance Indicators/Indicateurs de rendement

1. Assist IWD-NWT Programs Office to manage NOGAP program on Mackenzie River by meeting with their Water Quality Specialist at least twice per year and manage the research component of this program on behalf of NWRI.
2. Manage field sampling program at eight sites on the Mackenzie River in August of 1985.
3. Carry out and report on metal speciation analysis and other physico-chemical analyses of Mackenzie River sediments (bottom and suspended), by March 31, 1986 and commence experimental program on practical bioassay of metal species under Study No. 85-174.
4. Collaborate with NWRI-ECD on hydrocarbon species, bioavailability and toxicity, under Study No. 85-221.
5. Submit for publication one report on monitoring implications of organic contaminant pathways in the North Saskatchewan River, by March 31, 1986.
6. Carry out technology transfer on monitoring applications under Study Plan No. 85-170.

## Relevance/Objet

Research in support of: (1) Mackenzie River baseline monitoring program, (2) IWD-NOGAP objectives in the Mackenzie River corridor, (3) sediment quality initiatives of Sediment Survey of Canada, (4) Environmental Sensing Strategy of TCMP and (5) Saskatchewan Basin issue of TCMP.

09/84 FORM A, PART 1/FORMULE A, PARTIE 1

# ENVIRONMENTAL CONTAMINANTS DIVISION

## Environmental Contaminants Division

The Environmental Contaminants Division investigates in the field and in the laboratory, the pathways, fate and effects of five groupings of contaminants: organic chemicals, toxic metals, organo-metallics, radionuclides.

Research information produced by the Division is valuable in substantiating recommendations for water management actions in polluted river basins. These actions may involve control of effluents, banning of chemicals, guidelines for consumption of biota or water, and many other procedures which can be implemented in Canada. Data may be valuable in negotiations on water quality matters, either interprovincially or internationally. Much of the published information is equally valuable as part of the total input required for toxic chemicals assessments.

### Organics Pathways Section

The objective of this Section is to resolve the entry, fate, distribution, and transfer of organic contaminants in aquatic ecosystems. Research is conducted at specific polluted aquatic ecosystems and in the laboratory. Intercompartmental transfer (water, suspended sediment, sediment, benthic fauna, and flora) and effects of organic contaminants are examined. Atmospheric input of organic contaminants to the aquatic environment is being studied.

### Organics Properties Section

The objective of this Section is to determine the chemical and physical characteristics of toxic substances which govern their effects and pathways in aquatic systems. Field investigations are carried out to determine the distribution of certain contaminants, of contaminant-degrading microorganisms and to identify new contaminants and their sources. In the laboratory, experimental measurements of water/sediment and water/octanol partition coefficients, of bioaccumulation and depuration rates, and of the toxic effects of contaminants, are carried out.

### Inorganics Section

The objective of this section is to determine the persistence and fate of inorganic and organometallic contaminants in aquatic ecosystems. This is done through a combination of field and laboratory studies which address physical (e.g., volatilization and adsorption), chemical (hydrolysis, oxidation, ionic speciation and photodegradation) and biological (uptake and metabolism) aspects of persistence.

## Radionuclides Section

The major objective of this Section is to investigate the behaviour of both naturally-occurring and artificially-produced radionuclides in aquatic ecosystems. Studies include the determination of pathways of radionuclides discharged to lakes, the measurement of levels of these radionuclides in water, biota, and sediments, the application of predictive models for the dispersion of radionuclides into surface waters, and the development of methods for the determination of these radionuclides.

## Acid Deposition Section

The objective of research projects conducted by the Acid Deposition Section is to quantify and understand the hydrogeochemical response of acid-sensitive basins to the deposition of air pollutants. Projects utilize the Turkey Lakes Watershed (TLW) as the field study-site to define the most important geochemical mechanisms controlling the "dose-response" relationship for this basin. Study is focused on determining the factors or processes controlling short-term acidification associated with spring snowmelt.

## STUDIES FOR ENVIRONMENTAL CONTAMINANTS DIVISION

85/05/31.

| SECTION | STUDY | STUDY TITLE | STUDY LEADER |
|---|---|---|---|
| DIVISION | | | |
| | 200 | ENVIRONMENTAL CONTAMINANTS DIVISION MANAGEMENT AND ADMINISTRATION | ALLAN,R.J. |
| | 201 | ENVIRONMENTAL CONTAMINANTS DIVISION COMMITTEE INVOLVEMENT | ALLAN,R.J. |
| | 202 | MAJOR CAPITAL EQUIPMENT PLAN | ALLAN,R.J. |
| ORGANICS PROPERTIES | | | |
| | 210 | STRUCTURE-ACTIVITY CORRELATION (QSAR) OF CONTAMINANTS | KAISER,K.L.E. |
| | 211 | BIOAVAILABILITY OF ORGANIC CONTAMINANTS IN SEDIMENT | OLIVER,B.G. |
| | 212 | ORGANIC CONTAMINANTS IN THE GREAT LAKES BASIN | KAISER,K.L.E. |
| | 213 | CHLORINATED HYDROCARBONS IN SEDIMENTS AND BIOTA OF THE GREAT LAKES | OLIVER,B.G. |
| | 214 | MICROBIAL DEGRADATION OF CHLOROPHENOLS | BAXTER,R.M. |
| | 215 | ASSESSMENT AND REMOVAL OF CONTAMINANTS BY BIOTECHNOLOGY | LIU,D. |
| | 217 | ACCUMULATION/TOXICITY OF ORGANIC CONTAMINANTS BY YEAST/FUNGI | KWASNIEWSKA,K. |
| ORGANICS PATHWAYS | | | |
| | 220 | TRANSPORT OF PERSISTENT ORGANICS IN NIAGARA,ST.LAWRENCE R. & L.ONTARIO | FOX,M.E. |
| | 221 | POLYNUCLEAR AROMATIC HYDROCARBONS (PAHS) IN FRESHWATER ENVIRONMENTS | NAGY,E. |
| | 223 | MACROINVERTEBRATES AS BIOMONITORS OF ENVIRONMENTAL CONTAMINATION | METCALFE,J.L. |
| | 224 | ENVIRONMENTAL DISTRIBUTION OF TOXIC CHEMICALS | STRACHAN,W.M.J. |
| | 225 | PATHWAYS OF ORGANIC CONTAMINANTS IN FLUVIAL SYSTEMS | CAREY,J.H. |
| INORGANICS | | | |
| | 230 | SPECIATION, CONCENTRATION, PATHWAYS OF ALKYLLEADS IN THE ENVIRONMENT | CHAU,Y.K. |
| | 233 | FATE OF AMINES IN AQUATIC SYSTEMS | MAGUIRE,R.J. |
| | 234 | METAL SPECIATION IN THE ST. LAWRENCE RIVER | LUM,K.R. |
| | 236 | PHYSICO-CHEMICAL PROPERTIES AND METAL DISTRIBUTION IN SEDIMENT | MUDROCH,A. |
| ACID DEPOSITION | | | |
| | 250 | HYDROGEOCHEMICAL RESPONSES OF TURKEY LAKES TO ACID RAIN | SEMKIN,R.G. |
| | 251 | GEOCHEMICAL CONTROLS OF AQUATIC SYSTEM RESPONSE TO ACID RAIN | JEFFRIES,D.S. |
| RADIONUCLIDES | | | |
| | 241 | LEVELS AND PATHWAYS OF RADIONUCLIDES IN THE GREAT LAKES | JOSHI,S.R. |
| | 242 | AQUATIC PATHWAYS OF RADIONUCLIDES RELEASED BY URANIUM MINING | JOSHI,S.R. |
| | 243 | PARTITIONING OF RADIONUCLIDES AT NATURAL INTERFACES IN AQUATIC SYSTEMS | PLATFORD,R.F. |

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                                                            DATE RUN  85/05/23.
PROCESSING FORMB FOR DIVISION ECD

   ----ORGANIZATION---- --ENGINEERING---- -----MANTEC------ ---TECH OPS.--- --DM-- ------EXTERNAL---- SHADOW ----------TOTALS-----------
 NO  PY SAL    OM   CAP  PY SAL  OM  CAP  PY SAL   OM  CAP  PY SAL   OM OT PY SAL AG PY SAL   OM  CAP COST    PY SAL    CM   CAP   COST

200 2.2  92 112.5  11.0  -- --   --   -- .25  9   --   --   -- --   -- -- -- --    -- --   --   --   --  2.45 100 112.5  11.0  223.9

201 1.2  50  16.0    --  -- --   --   --  -- --   --   --   -- --   -- -- -- --    -- --   --   --   --  1.20  50  16.0    --   66.1

202  .2   8    --  99.0  -- --   --   --  -- --   --   --   -- --   -- -- -- --    -- --   --   --   --   .20   8    --  99.0  107.4

210  .8  33   9.0    --  -- --   --   --  -- --   --   --   -- --   -- -- -- --    -- --   --   --   --   .80  33   9.0    --   42.4

211  .6  25   7.0    --  -- --   --   --  -- --   --   --  .14  4  2.2  1 -- --GLW -- -- 31.5   --        .74  30  40.7    --   71.0

212  .9  38   6.0   9.0  -- --   --   --  -- --   --   --  .10  3  1.5  1 -- --    -- --   --   --
212                                                                  SHADOW SHIPS              0.0  1.00  41   7.5   9.0   57.6

213 1.3  54   8.0    --  -- --   --   --  -- --   --   --  .18  5   .7  3 -- --GLW -- -- 39.6   --
213                                                                  SHADOW SHIPS              0.0  1.48  62  48.3    --  118.7

214 2.0  84   4.0   5.5  -- --   --   --  -- --   --   --   -- --   -- -- -- --    -- --   --   --   --  2.00  84   4.0   5.5   93.1

215  .9  38   9.5   7.5  -- --   --   --  -- --   --   --   -- --   -- -- -- --    -- --   --   --   --   .90  38   9.5   7.5   54.6

217 1.0  42   6.5   4.0  -- --   --   --  -- --   --   --   -- --   -- -- -- --    -- --   --   --   --  1.00  42   6.5   4.0   52.3

220 1.6  57  14.0   7.0  -- --   --   --  -- --   --   --  .96 29  8.8 10 -- --GLW -- -- 28.8   --
220                                                                  SHADOW SHIPS              0.0  2.56 106  51.6   7.0  164.7

221 1.6  57   9.5    --  -- --   --   --  -- --   --   --  .02  1   .2 -- -- --    -- --   --   --   --  1.62  68   9.7    --   77.2

223 1.3  54   7.0   2.0  -- --   --   --  -- --   --   --  .35 11  2.3  1 -- --    -- --   --   --   --  1.65  66   9.3   2.0   77.2

224  .8  33  10.0  10.0  -- --   --   --  -- --   --   --  .08  2  1.2  1 -- --    -- --   --   --   --   .88  37  11.2  10.0   58.0

225 1.1  46  23.5  11.0  -- --   --   --  -- --   --   --  .07  2  4.7  1 -- --    -- --   --   --   --  1.17  49  28.2  11.0   88.3

230 2.0  84  12.0   5.3 .08  3   --   -- .10  3   --   --  .06  2  2.0  1 -- --GLW -- -- 29.7   --       2.24  93  43.7   5.3  141.5

233 1.7  71  16.5  16.5  -- --   --   --  -- --   --   --  .06  2  1.2  1 -- --    -- --   --   --   --  1.76  74  17.7  18.5  118.0

234 1.5  63  14.5  13.2  -- --   --   --  -- --   --   --  .36 11  2.4  2 -- --    -- --   --   --
234                                                                  SHADOW SHIPS              0.0  1.86  75  16.9  13.2  185.2

236 1.7  71  10.0   6.0  -- --   --   --  -- --   --   --  .83 25  2.6  6 -- --GLW -- --  9.0   --
236                                                                  SHADOW SHIPS              0.0  2.53 102  21.6   6.0  129.7

241 1.1  46   5.0   6.0  -- --   --   --  -- --   --   --   -- --   -- -- -- --    -- --   --   --
241                                                                  SHADOW SHIPS              0.0  1.10  46   5.0   6.0   57.0

242 1.5  63  10.5  10.0  -- --   --   --  -- --   --   --  .03  1  1.5  1 .15  5   -- --   --   --   --  1.68  69  12.0  10.0   91.2

243 1.2  50  13.0   5.0  -- --   --   --  -- --   --   --  .05  2   .6  0 -- --    -- --   --   --   --  1.25  52  13.6   5.0   78.5

250  .9  38   7.0   5.0 .03  1   --   -- .02  1   --   -- 1.30 39 13.0  9 -- --LRT2.20 92110.0  7.0       4.45 180 130.0  12.0  321.5
```

```
PROCESSING FORMB FOR DIVISION ECD                             DATE RUN  85/05/23.

  ----ORGANIZATION---- --ENGINEERING---- -----MANTEC------ ---TECH OPS.--- --DM-- ------EXTERNAL---- SHADOW ----------TOTALS-----------
 NO  PY SAL    OM    CAP  PY SAL   OM  CAP  PY SAL   OM  CAP  PY SAL   OM OT PY SAL AG PY SAL   OM  CAP COST   PY SAL   OM   CAP   COST

251  .9  35  13.0   5.0   -- --    --   --  .13  4   --   --  .20  6  3.0  4  -- --LRT .80 33 28.0   --       2.03  85  44.0   5.0  134.5

  38.00   344.0         .11     --        .50      --        4.79    47.9   .15      3.00  276.6        --        1590         247.0
     1254       240.0         4      --       17        --         145     40.     5       125      7.0     38.55      668.5        2585.8
```

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 200

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Environmental Contaminants Division Management and Administration | | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | MANAGEMENT, ADMINISTRATION | | SECTION ECDDIV |
| | | | PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Allan, R.J. | TEL: 637-4678 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | E. Kerr, F. Boyd | | |
| TIME FRAME/ CALENDRIER | START DEBUT | FINISH FIN Ongoing | - |
| PRIMARY USER/ USAGER PRIMAIRE | | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

Plan, organize, manage and control the scientific and administrative program of the Environmental Contaminants Division. To provide leadership by deciding on priority issues to be investigated and resolved by division scientists.

Performance Indicators/Indicateurs de rendement

1. Coordinate study plan preparation; quarterly written study progress reports; liaison with other federal, provincial, private agencies; and research grant reviews.
2. Convene section meetings, other impromptu meetings as required for program development biennial verbal discussions of projects with project leaders.
3. Liaise nationally and internationally with other research and operational agencies dealing with the issues of toxic chemicals and acid rain.
4. Provide secretarial services, administrative services, staff training, conference and program travel, telephone services, equipment and building repairs, publication and journal reprint charges, freight and brokerage costs, photocopier services, stores and word processing services.
5. Prepare staff appraisal and promotion documents.

Relevance/Objet

To promote efficiency, effectiveness and economy in the Division's projects and administration of A-Base and external funding under GLWQP, LRTAP and TCMP.

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Study Plan
Plan d'étude

| | | | |
|---|---|---|---|
| | | | NO: 85- 201 |
| STUDY TITLE/ TITRE D'ETUDE | Environmental Contaminants Division Committee Involvement | | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | CONTAMINANTS, COMMITTEES, GREAT LAKES, ACID RAIN, LRTAP, ENVIRONMENTAL CONTAMINANTS ACT | | SECTION ECDDIV<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Allan, R.J. | TEL: 637-4678 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>- |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Division staff as required and approved by Division Chief | | |
| TIME FRAME/ CALENDRIER | START DEBUT | FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To act on committees to:

a) review study proposals and allocate external funds.
b) review data, criteria documents, guidelines and provide advice or prepare integrated reports dealing with environmental contaminants.

Performance Indicators/Indicateurs de rendement

1. GLWQA, Lakes Toxic Contaminant - Allan/Strachan
2. GLWQA, Aquatic Ecosystems Objectives - Strachan
3. DOE/NHW - Toxic Chemicals Committee - Strachan
4. Sweden - ESTHER (Toxic Chemical Assessment) Evaluation - Strachan
5. LRTAP Algoma Watershed Steering Committee - Jeffries/Allan
6. ECA Evaluation Committee - Maguire/Strachan
7. AGRAD Working Group on Fate of Oil - Nagy
8. ASTM Oxygen Uptake Group - Liu
9. Un-FAO Marine Fouling Group - Liu
10. Standards Council of Canada - Chau/Liu
11. NWRI Management Team - Allan

Relevance/Objet

Technology Transfer.

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Study Plan
Plan d'étude

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|---|---|---|
| | | NO: 85- 202 |
| STUDY TITLE/ TITRE D'ETUDE | Major Capital Equipment Plan | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | CAPITAL, EQUIPMENT | SECTION ECDDIV |
| | | PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Allan, R.J. TEL: 637-4678 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>GLWQA, -<br>TCMP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Division Staff | |
| TIME FRAME/ CALENDRIER | START DEBUT FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

Major capital items can only be purchased at a Division level. Only rarely are individual studies of a nature which can justify large expenditures for items unique to one investigation. The goal is to make wise use of capital funding so as to respond best to issues tackled by the Division.

Performance Indicators/Indicateurs de rendement

See individual studies for specific use of major capital items to be purchased in a calendar year.

Relevance/Objet

Economical management of ECD Capital from internal and external funding.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 210

| | | |
|---|---|---|
| STUDY TITLE/<br>TITRE D'ETUDE | Structure-Activity Correlations (QSAR) of Contaminants | DIVISION<br>ECD |
| KEY WORDS/<br>MOTS CLEFS | TOXICITY, TOXIC SUBSTANCES, STRUCTURE, BACTERIA, FISH, YEAST, FUNGI, CONTAMINANTS | SECTION<br>OPROPS<br>PAE<br>EAP 4100 |
| STUDY LEADER/<br>CHEF D'ETUDE | Kaiser, K.L.E. TEL: 637-4244 | SUPPLEMENTAL RESOURCES/<br>FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/<br>MEMBRES D'EQUIPE | M. Comba, PDF (vacant), in collaboration with K. Kwasniewska, P.V. Hodson (GLFRB), D.G. Dixon (UoW) | |
| TIME FRAME/<br>CALENDRIER | START DEBUT 1982/83 FINISH FIN 1986/87 | |
| PRIMARY USER/<br>USAGER PRIMAIRE | RDG-OR,<br>DG-PID TEL: 186-8638<br>994-3960 | OTHER USERS/<br>AUTRES USAGERS |
| IWD/DGEI<br>CONTACT | A. Demayo, WQB-HQ TEL: 997-1920 | INTEREST/INTERET<br>DIRECT-GENERAL |

## Goal/But

To develop quantitative structure-activity correlations (QSAR) of toxic effects of selected groups of chemicals to representative aquatic species. Groups to be investigated include 1,4-disubstituted benzene derivatives with important functional groups, diphenyl ether and diphenyl amine derivatives and related compounds. Toxicity measurements will be undertaken with the Microtox™ analyzer, and in collaboration with other scientists on fish and yeasts.

## Performance Indicators/Indicateurs de rendement

1. One paper on QSAR of acute vs. chronic toxicities (Spring '85).
2. One report on QSAR of para-chloro substituted benzenes (Summer '85).
3. One paper on QSAR of symmetrically substituted benzenes and related compounds (Winter '85).
4. Planning and preparation of 2nd international workshop on QSAR in environmental toxicology (to be held early FY 86/87.

## Relevance/Objet

Of some 65,000 (plus!) organic chemicals in production, commerce and use, only 20% can be assessed on the basis of available toxicological data. For the remainder (80%) estimates have to be made on the basis of known data for other chemically related structures. This has been recognized by and is relevant to GLWQP, TCMP, NWRI (Toxics), as well as to AGCAN and NHW programs.

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|---|---|---|
| **NATIONAL WATER RESEARCH INSTITUTE**<br>**L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX** | **Study Plan**<br>**Plan d'étude** | **NO: 85-** 211 |

| | | |
|---|---|---|
| **STUDY TITLE/ TITRE D'ETUDE** | Bioavailability of Organic Contaminants in Sediment | **DIVISION** ECD |
| **KEY WORDS/ MOTS CLEFS** | BIOAVAILABILITY, CONTAMINANTS, NIAGARA RIVER, DETROIT RIVER, GREAT LAKES, SEDIMENTS, PCB'S, POLYNUCLEAR AROMATIC HYDROCARBONS, INVERTEBRATES | **SECTION** OPROPS<br>**PAE EAP** 4100 |
| **STUDY LEADER/ CHEF D'ETUDE** | Oliver, B.G. **TEL:** 637-4604 | **SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE** |
| **TEAM MEMBERS/ MEMBRES D'EQUIPE** | L. Durham (contract) | |
| **TIME FRAME/ CALENDRIER** | **START DEBUT** April 1985 **FINISH FIN** March 1986 | GLWQP - TCMP |
| **PRIMARY USER/ USAGER PRIMAIRE** | Dr. J.D. Kingham **TEL:** 996-6406 | **OTHER USERS/ AUTRES USAGERS** |
| **IWD/DGEI CONTACT** | M. Forbes, **TEL:** | **INTEREST/INTERET DIRECT-GENERAL** |

## Goal/But

1. Structure-bioavailability relationships for PAH's and chlorinated hydrocarbons.
2. Development of a routine procedure for estimating bioavailable organics in sediments.
3. Application of laboratory findings to the field.
4. Assess the importance of desorption of contaminants from resuspended sediments in controlling water concentrations of toxic organics.

## Performance Indicators/Indicateurs de rendement

1. Extension of biouptake work with oligochate worms to polycyclic aromatic hydrocarbons (PAH's).
2. Develop a simple solvent extraction procedure for measuring the bioavailable sediment associated organic contaminants.
3. Field studies at selected contaminated sites in the Great Lakes Basin (harbours and offshore) to confirm and test laboratory-derived relationships and procedures.
4. Further desorption/adsorption studies with a variety of chlorinated hydrocarbons using seston as well as bottom sediments.

## Relevance/Objet

The presence of persistent organic contaminants is Great Lakes sediments is well documented. It is important to find out what portion of this material is readily available to the biological community and what portion has, in effect, been removed from the system by association with the sediments. Input to Toxic Chemicals Fate modeling, GLWQ Agreement. Prior funding has come from GLWQP and TCMP.

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Study Plan
Plan d'étude

NO: 85- 212

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Organic Contaminants in the Great Lakes Basin | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | GREAT LAKES, LAKE ST. CLAIR, ST. CLAIR RIVER, DETROIT RIVER, ST. LAWRENCE RIVER, VOLATILES, HALOFORMS, CHLORINATED HYDROCARBONS, CONTAMINANTS | SECTION OPROPS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Kaiser, K.L.E. TEL: 637-4244 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>GLWQP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | M.E. Comba, Summer Student(s) | |
| TIME FRAME/ CALENDRIER | START DEBUT 1982/83 FINISH FIN 1987/88 | |
| PRIMARY USER/ USAGER PRIMAIRE | RDG - OR TEL: 186-8638 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | M. Forbes, WQB TEL: 997-1921 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To determine concentrations of volative halogenated contaminants in Great Lakes Basin waters, with special emphasis on the St. Clair River system, northern Great Lakes tributaries, and the St. Lawrence River.
2. To identify the contaminant sources and to determine contaminant associations and pathways and to identify unrecognized contaminants in the receiving waters.

## Performance Indicators/Indicateurs de rendement

1. One paper on volatile concentrations in the Lake St. Clair/St. Clair River systems (May '85).
2. Field sampling in the St. Clair and Detroit Rivers (Apr. '85).
3. One report on Microtox toxicities of Detroit River samples (June '85).
4. Preliminary report on St. Clair and Detroit River contaminants (Winter 85/86).

## Relevance/Objet

This work is relevant to the GLWQP, Toxic Chemicals Program (UGLCC), the NWRI (Toxics) objectives and the St. Lawrence River Action Plan.

**NATIONAL WATER RESEARCH INSTITUTE** **Study Plan**
**L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX** **Plan d'étude**

**NO: 85-** 213

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Chlorinated Hydrocarbons in Sediments and Biota of the Great Lakes | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | TOXIC ORGANICS, SEDIMENTS, FISH, GREAT LAKES, PCB'S POLYNUCLEAR AROMATIC HYDROCARBONS, PESTICIDES, DIOXINS, ST. CLAIR RIVER, LAKE ST. CLAIR, DETROIT RIVER, ST. LAWRENCE RIVER | SECTION OPROPS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Oliver, B.G. TEL: 637-4604 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | K.D. Nicol, S. Joshi, M. Charlton, H. Sloterdijk | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | - |
| PRIMARY USER/ USAGER PRIMAIRE | Dr. J.D. Kingham, RDG-OR TEL: 966-6406 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | K. Kuntz, WQB-OR TEL: 637-4641 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Sediment compound distribution maps (St. Clair R./Lake St. Clair area).
2. Historical loading pattern for the St. Clair and St. Lawrence Rivers.
3. Assessment of the importance of long range transport of toxic organics.
4. Predictive models for organics residues in field populations of sport and commercial fish.

Performance Indicators/Indicateurs de rendement

1. Analysis of sediments from the Great Lakes with emphasis on the St. Clair R./Lake St. Clair region for a variety of organic contaminants, PCB's, PAH's, chlorobenzenes, etc.
2. Analysis of core samples from Lake St. Clair and Lake St. Francis (on the St. Lawrence R.) for organic contaminants. Radiodating of cores will be done by S. Joshi. Some work on the concentration of contaminants on suspended solids using sediment traps with M. Charlton in these lakes will also be carried out.
3. Analysis of water and suspended sediments from the St. Clair, Niagara and Detroit Rivers to find out the significance of the volatization pathway for some chlorinated organics. Air sampling may also be required.
4. Analysis of fish and other biota in Lake Ontario and bioconcentration studies with A. Niimi (GLFRB).

Relevance/Objet

In addition to providing information on contaminant sources and sinks and historical loading patterns, this project will help develop a better understanding of factors and chemical properties which control environmental distributions. Input to GLWQP, toxic chemicals fate modelling, and the St. Lawrence River Action Plan.

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Study Plan
Plan d'étude

NO: 85- 214

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Microbial Degradation of Chlorophenols | DIVISION<br>ECD |
| KEY WORDS/ MOTS CLEFS | CHLOROPHENOLS, PENTACHLOROPHENOL, BACTERIA, BIODEGRADATION, MICROBIOLOGY PERSISTENCE | SECTION<br>OPROPS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Baxter, R.M. TEL: 637-4252 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>- |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT May 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To identify the product of the microbial degradation of chlorophenols, especially pentachlorophenol and elucidate the biochemical reactions involved.

## Performance Indicators/Indicateurs de rendement

At least one paper in or submitted to a scientific journal on degradation of chlorophenols by January 1986.

NOTE: This study was planned for 1984/85 but deferred because of temporary absence to work for CIDA on their Ethiopian Lake Programme.

## Relevance/Objet

Chlorophenols are a TCMP priority chemical, especially pentachlorophenol. They are persistent environmental contaminants. Little is known of the biochemical reactions by which they may be partially or completely degraded. Previous funding from TCMP. Information on chlorophenols pathways has been requested by Pacific and Yukon Region (#5581).

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Study Plan
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NO: 85- 215

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Assessment and Removal of Contaminants by Biotechnology | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | ASSESSMENT, CONTAMINANTS, BIOTECHNOLOGY, TOXICITY, BIODEGRADATION, BIOASSAY, PESTICIDES, BACTERIA, SYMPOSIUM, BIOLOGICAL MONITORING, MANUAL, STRUCTURE ACTIVITY RELATIONS | SECTION OPROPS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Liu, D. TEL: 637-4576 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | K. Thomson, K. Kaiser, K. Kwasniewska, B.J. Dutka (AMD) | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1989 | |
| PRIMARY USER/ USAGER PRIMAIRE | L. Simovic WTC/EPS TEL: 637-4696<br>T. Dafoe, WQB-HQ 185-73422 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | A.R. Davis, WQB-HQ TEL: 997-1920 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To develop super fast systems for the assessment of contaminant's activity (Nov '85).
2. Using such systems on model contaminants to develop QSAR (March '86).
3. To develop new process/procedure for the treatment or assessment of toxic wastewater (March '86).
4. To organize the 2nd International Symposium on Toxicity Testing Using Bacteria to be held on May 6-10, 1985 (May '85).
5. To initiate a new international journal on chemical toxicity assessment (January '86).
6. To develop toxicity screening manual for IWD for use in biological monitoring program.

Performance Indicators/Indicateurs de rendement

1. Holding 2nd International Symposium on Toxicity Testing Using Bacteria on May 6-10, 1985 in Banff, Alberta (May 1985).
2. One paper on the development of new assay system by December 1985.
3. One paper on QSAR of organic contaminants by March 1986.
4. One paper on biodegradation/wastewater by March 1986.
5. One typed draft of our own toxicity screening procedures by March 1986.

Relevance/Objet

Advice and support for the establishment of a Water Quality Branch Biomonitoring Program has been called for by WQB-HQ (June 12, 1984), implying the need for the development of biological assessment system for contaminants (TCMP). Furthermore, biodegradation has been identified by NRC/MOSST as one of the four National Biotechnology programs. Thus the study of biotechnology in the assessment and removal of contaminants is relevant to IWD, GLWQA, TCMP and NRC programs. In addition, a toxicity screening manual will be developed for IWD for use in the biological monitoring program.

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Study Plan
Plan d'étude

NO: 85- 217

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Accumulation/Toxicity of Organic Contaminants by Yeast/Fungi | | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | TOXIC SUBSTANCES, ACCUMULATION, BIODEGRADATION, LAKE ST. CLAIR, ST. LAWRENCE RIVER, BIOASSAY, YEAST, FUNGI, DETROIT RIVER, STRUCTURE ACTIVITY RELATIONS | | SECTION OPROPS<br>RAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Kwasniewska, K. | TEL: 637-4576 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>GLWQP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | K. Kaiser, D. Liu | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 | FINISH FIN March 1989 | |
| PRIMARY USER/ USAGER PRIMAIRE | K. Kaiser, D. Liu | TEL: 637-4244 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | M. Forbes, WQB-HQ | TEL: 997-1921 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To determine the distribution of predominant yeast and fungi and some bacteria in L. St. Clair/St. Clair River and Lake Erie.
2. To study the relationship between investigated chemicals and yeast and fungi (bioaccumulation, biodegradation or effect) in water of L. St. Clair, St. Clair River and/or Lake Erie sediment.
3. To apply yeast and fungi toxicity bioassay to the prediction of contaminants effects in the environment.

## Performance Indicators/Indicateurs de rendement

1. One paper (each on L. St. Clair/St. Clair River and Lake Erie and Lake Erie sediment) - predominant distribution of yeast and fungi in water of L. St. Clair/River (Spring '85).
2. One - toxicity, or growth inhibition of 9 chloro-substituted nitrobenzenes on four strains of yeast with QSAR calculation (Fall '85).
3. One - on bioaccumulation/biodegradation of some contaminants from water of L. St. Clair and River (Winter '85).

## Relevance/Objet

The WQB - HQ has recently called NWRI for advice and support for the establishment of a Water Quality Branch biomonitoring programme. Thus, this study is in accord with WQB plans and needs. In addition, the nature of the research work is relevant to GLWQA, TCMP and IWD programmes.

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NO: 85-220

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Transport of Persistent Organics in Niagara, St. Lawrence Rivers and Lake Ontario | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | ORGANICS, CONTAMINANTS, PERSISTENCE, NIAGARA RIVER, LAKE ONTARIO, ST. LAWRENCE RIVER, FATE, TRANSPORT | SECTION OPATHS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Fox, M.E. TEL: (416)637-4604 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>GLWQP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J.H. Carey, J.L. Metcalfe, L. Coletta | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1982 FINISH FIN March 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | E.T. Wagner, IWD-OR TEL: (416)637-4531 | OTHER USERS/ AUTRES USAGERS<br>2 |
| IWD/DGEI CONTACT | E.T. Wagner, IWD-OR TEL: (416)632-4531 | INTEREST/INTERET DIRECT-GENERAL<br>7 |

Goal/But

To determine the pathways and fate of persistent organic contaminants entering Lake Ontario from the Niagara River and leaving Lake Ontario via the St. Lawrence River.

Performance Indicators/Indicateurs de rendement

A. Niagara River Plume

1. Interim report and papers presented at IAGLR Conference in May 1985.
2. Three sampling cruises of 4-5 days each using CSS Limnos and newly developed radar tracked drogues. May, July and Sept. 1985.
3. Analysis of samples, data reduction and final report write-up - fall and winter 1985-86.

B. E. Lake Ontario and Bay of Quinte

1. Two field sampling trips of three days each to collect water, sediments and benthos from Bay of Quinte and extreme eastern Lake Ontario to St. Lawrence River - June and August 1985.
2. Analysis of samples - Fall 1985.
3. Data reduction, discussions with IWD Quebec Region and preliminary report - Winter 1985/86.

Relevance/Objet

A. 1982/83 1982/83 studies have indicated that much of the contaminant load of persistent organics from the Niagara River is transported out of the immediate river mouth area in true solution. The association of this study with complementary APSD studies should help to define the fate of these materials. Niagara River is GLWQ Toxics Program and IJC Priority A area.

B. This new addition to the study extends the Niagara plume transport techniques and concepts to E. Lake Ontario where the input to toxic organics to the St. Lawrence R. is of interest to IWD Quebec Region (IWD REsearch needs #'s 5014 and 5024). The Bay of Quinte is an important source of such compounds [e.g. Fox and Joshi (1984)] and will receive special attention in this study.

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**Study Plan**
**Plan d'étude**

**NO: 85-** 221

| | | | |
|---|---|---|---|
| **STUDY TITLE/ TITRE D'ETUDE** | Polynuclear Aromatic Hydrocarbons (PAHs) in Freshwater Environments | | |
| **KEY WORDS/ MOTS CLEFS** | TOXIC SUBSTANCES, PATHWAYS, ENERGY PRODUCTION, ONTARIO, PRAIRIES, BRITISH COLUMBIA, POLYNUCLEAR AROMATIC HYDROCARBONS | | |
| **STUDY LEADER/ CHEF D'ETUDE** | Nagy, E. | **TEL:** | 637-4685 |
| **TEAM MEMBERS/ MEMBRES D'EQUIPE** | J.H. Carey, J.H. Hart | | |
| **TIME FRAME/ CALENDRIER** | **START DEBUT** April 1985 | **FINISH FIN** | March 1990 |
| **PRIMARY USER/ USAGER PRIMAIRE** | | **TEL:** | |
| **IWD/DGEI CONTACT** | | **TEL:** | |

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|---|---|
| **DIVISION** | ECD |
| **SECTION** | OPATHS |
| **PAE EAP** | 4100 |
| **SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE** | - |
| **OTHER USERS/ AUTRES USAGERS** | |
| **INTEREST/INTERET DIRECT-GENERAL** | |

## Goal/But

To determine the persistence and pathways of PAHs in specific Canadian freshwater environments -

- by analyzing the composition of PAH assemblages in specific geographic areas: Ontario (energy production, steel industry), Prairies (petroleum, tar sands, lignite), British Columbia (coal mining, forest fires), Atlantic Provinces (coal mining) (Years 1 and 2).
- by analyzing spatial and temporal variations in PAH assemblages in areas selected during the first phase of the study (Years 3 to 5).
- by placing a special emphasis on the analysis of high molecular weight PAHs, nitro- and amino PAHs and methylated derivatives as source identifiers (Years 1 to 5).

## Performance Indicators/Indicateurs de rendement

The initial phase of the study (1985) will consist of:

1. Evaluation of an HPLC/Fluorescence method for the analysis of unsubstituted, methylated, nitro- and amino PAHs, and comparison with capillary GC/FID.
2. Collection and analysis of water and sediment samples from:
   - Burlington Bay (coal coking operation)
   - St. Clair/Detroit River (energy production)
   - Saskatchewan and Alberta (lignite, petroleum, tar sand)
   - British Columbia (coal mining, forest fires)
   - McKenzie River (tar sand)

## Relevance

Better understanding of the distribution, persistence, and pathways of toxic and carcinogenic PAHs could:

- indicate activities or industries where emission controls may produce the greatest benefits, and
- produce significant input to policy makers considering energy production alternatives, and possible future developments in coal utilization in energy production or in new coal refining processes.

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Study Plan
Plan d'étude

NO: 85- 223

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Macroinvertebrates as Biomonitors of Environmental Contamination | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | MACROINVERTEBRATES, BIOMONITORS, BIOINDICES, TOXIC SUBSTANCES, GRAND RIVER, NORTH SASKATCHEWAN RIVER, SAINT JOHN RIVER, OTTAWA RIVER | SECTION OPATHS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Metcalfe, J.L. TEL: 637-4685 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J.H. Carey, M.E. Fox, P.A. Coletta, J.H. Hart, M.N. Charlton | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1988 | TCMP - |
| PRIMARY USER/ USAGER PRIMAIRE | W. Gummer TEL: | OTHER USERS/ AUTRES USAGERS 2 |
| IWD/DGEI CONTACT | T.O. Tuominan, WQB - P&YR TEL: 980-6915 | INTEREST/INTERET DIRECT-GENERAL 10 |

Goal/But

To assess the potential of using macroinvertebrates in monitoring the health of the aquatic environment by:

1. Preparing a literature review on biotic indices and evaluating their applicability, on a national scale, to the Canadian environment.
2. Conducting a detailed survey of the pollution status of the Grand River Watershed, Ontario. The relative importance of three diagnostic tools will be examined:
   - water quality data
   - levels of selected contaminants in tissues of sentinel organisms (e.g. leeches, molluscs)
   - benthic macroinvertebrate community structure.
3. Conducting a similar, but less intensive, study on the North Saskatchewan River, Alberta.
4. Compiling available water quality and benthic community data for the Saint John River, N.B., to assess the feasibility of a comparative study in the Maritimes region in the next fiscal year. The Ottawa River is an alternative.

Performance Indicators/Indicateurs de rendement

1. Compile the most recent water quality data for the Grand and North Saskatchewan Rivers, in order to select appropriate sampling sites, by June '85.
2. Complete sampling on the North Saskatchewan River by Sept. '85.
3. Prepare report on bioindices by March '86.
4. Prepare report on the Grand River study by March '86.
5. Compile data on the Saint John River, and select study sites for the 1986/87 fiscal year by March '86.

Relevance/Objet

Research into the fate of contaminants in polluted aquatic systems is a Directorate priority. Knowledge of the potential and actual impact of toxic substances on the environment is a Toxic Substances Program objective.

The Water Quality Branch has identified the need for selecting suitable biomonitoring techniques for incorporation into existing national water quality monitoring programs. The North Saskatchewan and Saint John Rivers are of direct interest.

This study is relevant to the following IWD Research Needs: 5322-WQB-W&NR-1982; 5702-WQB-W&NR-1983; 5084 & 5064-WQB-OR-1982; 5527-WQB-HQ-1982.

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|---|---|---|
| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | Study Plan<br>Plan d'étude | NO: 85-224 |
| STUDY TITLE/ TITRE D'ETUDE | Environmental Distribution of Toxic Chemicals | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | GREAT LAKES, WESTERN & NORTHERN REGION, PRECIPITATION, RAIN, PCB, TOXAPHENE, PESTICIDES, ORGANOCHLORINE, TRANSPORT | SECTION OPATHS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Strachan, W.M.J. TEL: 637-4222 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | C. Chan (IWD-OR), D. Gregor (IWD-W&NR), Chem Technician, Visiting Fellow | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | GLWQP |
| PRIMARY USER/ USAGER PRIMAIRE | ADM-EPS, RDG-OR, IJC-SAB/AEOC, Dir. CCB/EPS, RDG-W&NR, P&YR TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To develop and evaluate methods of predicting the behaviour of persistent organic chemicals in the aquatic environment.

Performance Indicators/Indicateurs de rendement

1. Report on levels of contaminants in rain from W&N, Alt. and Ont. Regions. (September 1985).
2. Collect and analyse rain samples for PCBs, OCs and toxaphene from 2 sites in the W&N Region and 1 from P&Y Region contingent on regional support (collection by October 1985, analysis by March 1986).
3. Literature survey on characteristics of several of organic substances found in the Great Lakes ecosystem (June 1985).
4. The distribution of 1 or 2 chemicals in an abiotic microcosm will be compared results from computerized models (prel. rep. in FY 85-86).
5. Establish a network rain samplers on the Canadian side of the Great Lakes contingent on Regional Support. (in FY 85-86).
6. Assist WQB(HQ) in their CCREM Review of Water Quality Guidelines.

Relevance/Objet

Wetfall loading has been identified (IJC-SAB) as a major concern in the Great Lakes and data of the sort to be obtained in (1) and (5) is one of their research needs. The Great Lakes Environmental Administrators have specifically called for the work in (5) and it is also IWD (Ont) Research Need 5303 (1982). W&NR has previously provided support for similar work (2) in their region and include support in proposals for FY85-86. Work in P&YR is to determine if a comparable problem exists there (TCMP Regional Issues include it for the lower B.C. mainland; it is also IWD(P&YR) Research Need 511 (1981)). Modelling activities in (3) and (4) are aimed at evaluating computer models of environmental chemical distributions. This is of considerable potential use in the IJC in the assessment of Appendix E chemicals and to the ECA and OECD in evaluating new and existing chemicals. Such models are also cost-effective tools to assist ECS and other TCMP managers in defining research and surveillance activities for toxic chemicals. National guidelines and research needs for water quality assessments are being prepared for CCREM. The WQB (HQ) has specifically requested assistance in this task from this study. Similar work is done for the IJC-SAB's Aquatic Ecosystem Objectives Committee.

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Study Plan
Plan d'étude

NO: 85- 225

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Pathways of Organic Contaminants in Fluvial Systems | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | CONTAMINANTS, BIOACCUMULATION, DEGRADATION, PATHWAYS, FRASER RIVER, NORTH SASKATCHEWAN RIVER, CHLOROPHENOLS | SECTION OPATHS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Carey, J.H. TEL: 637-4693 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>TCMP (REQ) |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J. Metcalfe, L. Coletta, J. Hart | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | T. Tuominan, WQB - P&YR TEL: 980-6915 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. Continue chlorophenols pathways research in the Fraser River and tributaries by examining a wider variety of ecosystem types.
2. Continue participation in Saskatchewan River Basin study by initiating detailed study of contaminant pathways in a reach of the N. Saskatchewan River.
3. Complete reports on Canagagigue Creek Study and aquatic photochemistry of contaminants.

## Performance Indicators/Indicateurs de rendement

1. Report on concentration and distribution of chlorophenols in water, sediment and biota of the North Arm, Fraser Estuary by Dec. 1985.
2. Conduct field work in Fraser River Basin by Oct. 1985.
3. Report on concentration and distribution of chlorophenols and other contaminants in N. Saskatchewan River by Dec. 1985.
4. Begin detailed pathways study on one reach of the N. Saskatchewan River by Sept. 1985.
5. Analyze river samples from WQB/W&NR for previously unidentified compounds.
6. Two reports on Canagagigue Creek by Sept. 1985.

## Relevance/Objet

1. Resolving the pathways of contaminants in real watersheds is a high priority for the Directorate, Service and Department - chlorophenols are a priority chemical - previous TCMP funding.
2. When the Fraser River Management Plan is implemented, information on the nature and distribution of contaminants will be needed to formulate the Water Quality Plan. Contaminant research in the Fraser River Delta area an identified IWD Research Need (P&Y, #5081, 1981) as is information on chlorophenol pathways (P&Y, #5581, 1983).
3. Pathways of contaminants in interprovincial waters is an identified research need for W&N Region #5362, 1982 and #5702, 1983.

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Study Plan
Plan d'étude

NO: 85-230

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Speciation, Concentration, Pathways of Alkylleads in the Environment | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | ALKYLLEAD, BIOCONCENTRATION, DEGRADATION, PATHWAYS, MAITLAND, ST. LAWRENCE RIVER, ST. CLAIR RIVER | SECTION INORGS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Chau, Y.K. TEL: 637-4707 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | G.A. Bengert, P.T.S. Wong (GLFRB) | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | GLWQP |
| PRIMARY USER/ USAGER PRIMAIRE | RDG (OR) for Great Lakes TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | B.K. Afghan, NWQL TEL: 637-4661 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. Study of bioconcentration of alkyllead compounds in Maitland and St. Clair River using caged clams in Summer 1985.
2. Study of uptake and metabolism of alkyllead in biota by December 1985.
3. Continuation with occurrence study in Maitland and St. Clair River areas.

## Performance Indicators/Indicateurs de rendement

1. Completion of analysis of caged clams by December 1985.
2. Completion of study of uptake and metabolism of alkyllead by biota in February 1986.
3. Publication on uptake and metabolism of alkyllead by biota by March 1986.

## Relevance/Objet

Following our initial findings of alkyllead compounds in fish, water, sediment and macrophytes in Maitland, St. Lawrence River and St. Clair River, several administration (EPS, DFO, DOE, MOE) have expressed immediate concern in assessing their environmental impacts. Contracts were given out by DFO, EPS and facilities have been set up in MOE to study alkyllead compounds. NHW is conducting studies on mammalian toxicity of these compounds as there is no criteria for their permissible levels in food. Alkyllead in ranked among priority chemicals in the GLWQ funding list.

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Study Plan
Plan d'étude

NO: 85- 233

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Fate of Amines in Aquatic Systems | | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | AMINES, DYES, NITROGEN, PERSISTENCE, FATE, SEDIMENTS, WATER | | SECTION INORGS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Maguire, R.J. | TEL: 637-4225 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | R.J. Tkacz | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1988 | | - |
| PRIMARY USER/ USAGER PRIMAIRE | Director, Chemical Control Branch, EPS | TEL: 997-3201 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To determine the persistence and fate of amines in aquatic systems. The plan of action is outlined below. This is a new study.

## Performance Indicators/Indicateurs de rendement

1. Development of analytical methods for amines in water, sediment and biota - report by Feb. 1986.
2. Site selection based on discussions with EPS-HQ and WQB-QR personnel. Sample collection (and analysis) from St. Lawrence River (Lac St. Francois and possibly the Yamaska River). Report by March 1986.
3. Based on (1) and (2) above, selection of a particular amine in a particular location for intensive study in field and laboratory experiments.

## Relevance/Objet

Aromatic amines are on the Environmental Contaminants Act Candidate Chemicals List, which means that information is required on environmental occurrence, persistence and toxicity. Amines in general are high-volume industrial chemicals, and many are carcinogenic. Relatively little information is available in the scientific literature on their occurrence and persistence.

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| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | Study Plan<br>Plan d'étude | NO: 85-234 |
| STUDY TITLE/<br>TITRE D'ETUDE | Metal Speciation in the St. Lawrence River | DIVISION ECD |
| KEY WORDS/<br>MOTS CLEFS | DISSOLVED TOXIC ELEMENTS, PARTICULATE METALS, TOXIC METALS, RIVERS, LAKES, ST. LAWRENCE RIVER, GREAT LAKES | SECTION INORGS<br>PAE EAP 4100 |
| STUDY LEADER/<br>CHEF D'ETUDE | Lum, K.R. TEL: 637-4617 | SUPPLEMENTAL RESOURCES/<br>FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/<br>MEMBRES D'EQUIPE | E. Kokotich | |
| TIME FRAME/<br>CALENDRIER | START DEBUT April 1985 FINISH FIN December 1988 | |
| PRIMARY USER/<br>USAGER PRIMAIRE | RDG, IWD - Quebec Region TEL: | OTHER USERS/<br>AUTRES USAGERS |
| IWD/DGEI CONTACT | T.L. Tremblay TEL: 666-6038 | INTEREST/INTERET<br>DIRECT-GENERAL |

Goal/But

1. Determine the partitioning of trace elements in the St. Lawrence River from Cornwall to Quebec City: Dec. 1988.
2. Determine environmental impact of contaminant inputs in the salt wedge between Quebec City and the Saguenay Fjord.

Performance Indicators/Indicateurs de rendement

1. - Plan integration, selection of sampling location by May 1985.
   - Collection of water and suspended sediments by December 1985.
   - Freeze-drying, sample work-up, column elutions by Jan. 1986.
   - Analyses by June 1986.
   - Strategic sampling/water and suspended sediments by Dec. 1986.
   - Sample work-up, etc. by Feb. 1987.
   - Analyses by June 1987.
   - Data summaries by Oct. 1987.
   - Pathways evaluation, report by Dec. 1988.

Relevance/Objet

1. More than half of Quebec's population obtains drinking water from the St. Lawrence and hence the dissolved metal determinations would be valuable information on ambient water quality. In addition, there is considerable concern for contamination from Lake Ontario and the Ottawa River as well as from inputs along the river which have resulted in public recognition of the St. Lawrence as a polluted water body. This study (in its first year) will be a preliminary characterization of the suspended load of toxic and nutrient elements. In subsequent years the question of environmental impact on the estuary will be addressed and an estimate of potential effects on the Gulf of St. Lawrence made.

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**Study Plan**
**Plan d'étude**

**NO: 85-** 236

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|---|---|---|
| **STUDY TITLE/ TITRE D'ETUDE** | Physico-chemical Properties and Metal Distribution in Sediment | **DIVISION** ECD |
| **KEY WORDS/ MOTS CLEFS** | TOXICITY, SEDIMENTS, METALS, AVAILABILITY, GREAT LAKES SYSTEM, ST. LAWRENCE RIVER, GOLD MINING AREAS IN CANADA | **SECTION** INORGS<br>**PAE EAP** 4100 |
| **STUDY LEADER/ CHEF D'ETUDE** | Mudroch, A. **TEL:** 637-4707 | **SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE** |
| **TEAM MEMBERS/ MEMBRES D'EQUIPE** | J. Metcalfe, E. Kokotich, A.H. El-Shaarawi, A.G. Bobba | |
| **TIME FRAME/ CALENDRIER** | **START DEBUT** April 1985 **FINISH FIN** March 1988 | GLWQP - TCMP |
| **PRIMARY USER/ USAGER PRIMAIRE** | DG(PID) **TEL:** | **OTHER USERS/ AUTRES USAGERS** |
| **IWD/DGEI CONTACT** | IWD Quebec Region **TEL:** | **INTEREST/INTERET DIRECT-GENERAL** |

## Goal/But

Assessment of the pollution potential and toxicity of bottom sediments to recommend remedial options to minimize the environmental impact on an aquatic ecosystem (finished by March 1988).

## Performance Indicators/Indicateurs de rendement

1. Investigation of heterogeneity of metal distribution in lacustrine and fluvial sediments, in particular at areas close to point sources (waste disposal, dump sites, industrial discharge, mining activities). Report or paper on assessment and possible modelling of the pattern of sediment heterogeneity (by March 1986).
2. Determination of metals partitioning among sediment components (various particle sizes, minerals and pore water) availability of metals from individual compartments. Report or paper on availability of metals from various sediment compartments to aquatic biota (plankton, benthic organism, macrophytes) (by March 1986).
3. Effects of physicochemical properties of sediment on concentration of metals in sediment pore water. Report or paper on development of a numerical model of migration of metals from dredged material placed on the lake bottom and capped with clean sediment (by March 1986).

## Relevance/Objet

Under ECS and GLWQA research is directed to investigate the sources and pathways of toxic substances in the aquatic environment and to generate predictive information of the water quality of Canadian water bodies. The study is relevant to DOE objective (B), ECS sub-objective (4) and to GLWQA, Annex 7: Dredging.

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Study Plan
Plan d'étude

NO: 85- 241

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|---|---|---|
| STUDY TITLE/<br>TITRE D'ETUDE | Levels and Pathways of Radionuclides in the Great Lakes | DIVISION<br>ECD |
| KEY WORDS/<br>MOTS CLEFS | RADIOACTIVITY, GREAT LAKES, WATER QUALITY, ANALYTICAL METHODS, SEDIMENTS, TRENDS, MODELS, TECHNETIUM-99 | SECTION<br>RANUCS<br>PAE<br>EAP 4100 |
| STUDY LEADER/<br>CHEF D'ETUDE | Joshi, S.R. TEL: 637-4573 | SUPPLEMENTAL RESOURCES/<br>FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/<br>MEMBRES D'EQUIPE | A.H. El-Shaarawi, A.G. Bobba, S.P. Thompson, P.D.F. | |
| TIME FRAME/<br>CALENDRIER | START<br>DEBUT April 1985 FINISH<br>FIN March 1988 | GLWQA |
| PRIMARY USER/<br>USAGER PRIMAIRE | RDG OR TEL: | OTHER USERS/<br>AUTRES USAGERS |
| IWD/DGEI<br>CONTACT | TEL: | INTEREST/INTERET<br>DIRECT-GENERAL |

Goal/But

1. Develop technique for the measurement of 99Tc in water on a routine basis, and assess its applicability to biota and sediments.
2. Analyse $^{210}$Pb and $^{137}$Cs profiles in Lakes Ontario and Huron using a two-layer model.
3. Carry out statistical trend analysis of radionuclide levels in the Great Lakes.
4. Investigate the significance of an apparent relationship between flux of $^{210}$Pb at sediment/water interface and mass sedimentation rate.
5. Determine residence times of $^{137}$Cs and $^{90}$Sr in the Great Lakes using an improved model.

Performance Indicators/Indicateurs de rendement

1. Paper on $^{99}$Tc methodology development by March '86; arrange 1986-87 sampling programme by December 1985.
2. Paper on the profiles of $^{137}$Cs in Lake Huron sediments by August 1985.
3. Paper on the profiles of $^{210}$Pb in Lake Ontario sediments by December 1985.
4. Paper on residence times of $^{137}$Cs and $^{90}$Sr in Great Lakes waters by March 1986.
5. Paper on radionuclides trends in the Great Lakes water by March 1986.
6. Assess the relationship between mass sedimentation rate and flux of $^{210}$Pb at sediment/water interface by March 1986 (Paper by December 1986).

Relevance/Objet

Establishing levels and resolving pathways of toxic chemicals, including radionuclides, in Canadian aquatic ecosystems is a high priority for the DOE. Input to GLWQP. Levels and pathways of $^{99}$Tc have not be investigated in any Canadian aquatic system. Previous work (Joshi, S.R., Sci Total Environ., in press; R.W. Durham and S.R. Joshi, Environ. Monit. & Assessment, in press) has shown the presence of other radionuclides in Great Lakes waters and sediments; the present study is designed to utilize data accumulated over the previous 12 years (with funding from IWD and GLWQP) to assess the behaviour/fate of these radionuclides.

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Study Plan
Plan d'étude

NO: 85- 242

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Aquatic Pathways of Radionuclides Released by Uranium Mining | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | RADIOACTIVITY, LAKES, SEDIMENTS, PATHWAYS, FISH, ENERGY, URANIUM MILLING, TRACE ELEMENTS, SASKATCHEWAN | SECTION RANUCS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Joshi, S.R. TEL: 637-4573 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>EPS,W&NR |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | R.F. Platford, S.P. Thompson, J.A. Fitzgerald | |
| TIME FRAME/ CALENDRIER | START DEBUT 1983 FINISH FIN 1988 | |
| PRIMARY USER/ USAGER PRIMAIRE | M.A. Sharpe, Edmonton TEL: 420-2590 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | B.K. Afghan, NWQL TEL: 637-4661 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Determine concentrations of U and Th (and their daughters) and selected trace elements in sediment cores, water and biota from Langley Bay/Lake Athabasca.
2. Assess the data accumulated and plan further field activities.

Performance Indicators/Indicateurs de rendement

1. One paper on radionuclides and trace elements in sediment cores by October 1985.
2. One paper on radionuclides and trace elements in fish and waters by March 1986.
3. Plan field trip for FY 1986-87.

Relevance/Objet

Resolving the pathways of toxic contaminants, including radionuclides, in water bodies is a high priority for the Directorate, Service and the Department. Previous EPS, W&NR funding.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 243

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Partitioning of Radionuclides at Natural Interfaces in Aquatic Systems | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | RADIOACTIVITY, FALLOUT, BIOACCUMULATION | SECTION RANUCS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Platford, R.F. TEL: 637-4252 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J.A. Fitzgerald, S.R. Joshi | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | RDG - Ont.<br>EPS (Goffin, Toronto, MacGregor, PVM) TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To measure the relative concentrations of long-lived radionuclides in lake and river waters and in biota floating on the surface or living in the upper sediments.

## Performance Indicators/Indicateurs de rendement

Will make three or four sampling trips during the early summer to collect water samples, surface water samples and sediment samples from selected areas around the lower Great Lakes and upper St. Lawrence River. These are to be analyzed for tritium, lead-210, radium-226, and fission products to determine their enrichment in surface active materials. Report will be submitted by March 1985.

## Relevance/Objet

Knowledge of the distribution in the water column of radionuclides, and particularly of lead-210 and radium-226, the distribution of which is not well known in the Great Lakes area.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-250

| | | | |
|---|---|---|---|
| STUDY TITLE/<br>TITRE D'ETUDE | Hydrogeochemical Responses of Turkey Lakes to Acid Rain | | |
| KEY WORDS/<br>MOTS CLEFS | ACID RAIN, GEOCHEMISTRY, LRTAP, IONIC BUDGETS, GROUNDWATER, ACID LAKES | | |
| STUDY LEADER/<br>CHEF D'ETUDE | Semkin, R.G. | TEL: | 637-4397 |
| TEAM MEMBERS/<br>MEMBRES D'EQUIPE | D.S. Jeffries, R. Neureuther, M. Jones, J. Longlade | | |
| TIME FRAME/<br>CALENDRIER | START<br>DEBUT 1980 | FINISH<br>FIN | 1988 |
| PRIMARY USER/<br>USAGER PRIMAIRE | F.C. Elder, LRTAP | TEL: | 637-4212 |
| IWD/DGEI<br>CONTACT | D. Haffner, WQB-HQ | TEL: | 997-3422 |

| | |
|---|---|
| DIVISION | ECD |
| SECTION | ACDEPS |
| PAE<br>EAP | 4200 |
| SUPPLEMENTAL RESOURCES/<br>FINANCEMENT SUPPLEMENTAIRE | LRTAP III |
| OTHER USERS/<br>AUTRES USAGERS | 1 |
| INTEREST/INTERET | DIRECT-GENERAL |

Goal/But

To quantify the hydrogeochemical response of the Turkey Lakes Watershed (TLW) to acidic precipitation using a mass balance approach. The study will focus on determining the "dose-response" relationship for the basin and the geochemical mechanisms controlling the relationship. This is an ongoing study; major reports on fundings will be produced in 1985 and 1986.

Performance Indicators/Indicateurs de rendement

The following activities will occur in pursuit of the above goal:

1. Continue year-round measurement of hydrological budget.
2. Continue year-round measurement of precipitation, lake and stream chemistry.
3. In cooperation with NHRI, assess the importance of groundwater to the hydrological and chemical budgets to TLW.
4. Calculate appropriate budgets from data collected from 1981-1984 (Spring - Summer, 1985).
5. From the budgets, describe the movement of chemical constituents through the various components of the TLW (Summer, 1985).

Reports:

1. Report on 81/82, 82/83, 83/84 mass balances (August, 1985).
2. Report on lake chemistry (March, 1986).

Relevance/Objet

Relevant to an objective established by the LRTAP Steering Committee, to determine the mechanisms which control the response of aquatic ecosystems to LRTAP.

09/84

FORM A, PART 1/FORMULE A, PARTIE 1

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-251

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Geochemical Controls of Aquatic System Response to Acid Rain | DIVISION ECD |
| KEY WORDS/ MOTS CLEFS | ACID RAIN, BUFFERING CAPACITY, IONIC BUDGETS, SNOWMELT, CONTAMINANTS, pH, LRTAP, ACID LAKES, GEOCHEMISTRY | SECTION ACDEPS<br>PAE EAP 4200 |
| STUDY LEADER/ CHEF D'ETUDE | Jeffries, D.S. TEL: 637-4397 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>LRTAP III |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | R.G. Semkin, M. English (PDF) | |
| TIME FRAME/ CALENDRIER | START DEBUT 1981 FINISH FIN 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | F.C. Elder, LRTAP TEL: 637-4212 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | S. Whitlow, WQB-HQ TEL: 997-3422 | INTEREST/INTERET DIRECT-GENERAL 7 |

Goal/But

To develop an understanding of the geochemical response of drainage basins and associated lakes to acid precipitation and atmospheric loading of other contaminants. This ongoing study will focus on delineating the important factors controlling both long and short-term acidification of basins. As currently formulated, major reports on findings will be produced in 1985 and 1986.

Performance Indicators/Indicateurs de rendement

The following activities will occur in pursuit of the above:

1. Investigate the influence of LRTAP on mass budgets in the Turkey Lakes Watershed (TLW). This is an ongoing and continued activity.
2. Assessment of the snowpack storage and release of acids and associated variation in stream and lake pH during spring melt. This involves collection and analysis of snowpack and meltwater samples throughout the winter and spring.
3. Investigate temporal and spatial variations in the concentration and speciation of aluminum in headwater streams and Batchawana Lake in the TLW which involves collection and analysis of stream, soil, and lake waters throughout the year.

The following reports will be prepared:

1. Report on snowpack chemistry in TLW (July 1985).
2. Report on the snow corral equipment, a) Hydrology (July 1985) and b) Chemistry (August 1985).
3. Preliminary report on Al speciation in TLW (Jan. 1986).

Relevance/Objet

Long-range transport of atmospheric pollutants is causing acidic deposition to occur in much of southern Ontario, Quebec, and the Maritime Provinces, The rate of acidification of the receiving surface waters is poorly understood. Long and short term acidification can be expected to affect biota in different ways.

# HYDRAULICS DIVISION

## Hydraulics Division

The Hydraulics Division has five mandates.

The first is to undertake research into all aspects of the hydraulics of inland waters. This includes research and model development for physical processes and phenomena in lakes, rivers, and reservoirs, including geophysical processes and ice.

The maintenance and calibration of current meters and sediment samplers is the second mandate in collaboration with the Water Resources Branch.

The third mandate is to provide a drafting service which produces diagrams, figures, and illustrations for scientific publications as well as slides and material for verbal presentations.

Engineering expertise is applied to the development of systems and methods to measure environmental variables in the field or laboratory, as well as the development and improvement of equipment to obtain samples of water or sediment. This fourth mandate provides support to all scientific divisions in the Institute and occasionally to others.

Lastly, the fifth mandate is to ensure that scientific equipment is repaired and calibrated according to standard procedures. In addition, prototypes of equipment and sensors are also designed and manufactured. This technical service supports all Institute Divisions and occasionally others.

# STUDIES FOR HYDRAULICS DIVISION

85/05/31.

| SECTION | STUDY | STUDY TITLE | STUDY LEADER |
|---|---|---|---|
| DIVISION | | | |
| | 310 | HYDRAULICS DIVISION MANAGEMENT AND ADMINISTRATION | DICK,T.M. |
| | 311 | DIVISION MANAGEMENT (SUPPORT) | DICK,T.M. |
| | 318 | APPLIED RESEARCH AND ENGINEERING STUDIES | DICK,T.M. |
| SHORE PROCESSES | | | |
| | 320 | AIR-WATER INTERACTION | DONELAN,M.A. |
| | 321 | SHORE CONSERVATION | SKAFEL,M.G. |
| | 322 | LITTORAL AND FLUVIAL SEDIMENTOLOGY AND GEOTECHNIQUE | COAKLEY,J.P. |
| | 323 | DYNAMICS OF SEDIMENTS - TORONTO HARBOUR | COAKLEY,J.P. |
| | 324 | SEDIMENTOLOGY, LOWER GREAT LAKES - LAC ST. LOUIS | RUKAVINA,N.A. |
| | 325 | SHORE DEVELOPMENTS | SKAFEL,M.G. |
| TECHNICAL SERVICES | | | |
| | 330 | LABORATORY SERVICES | DEZEEUW,C. |
| | 331 | NATIONAL CALIBRATION SERVICE | DEZEEUW,C. |
| | 399 | NWRI OPEN HOUSE 85 | ENGEL,P. |
| ENVIRONMENTAL HYDRAULICS | | | |
| | 340 | FRAZIL AND ANCHOR ICE STUDIES | TSANG,G. |
| | 341 | WATER QUALITY AND QUANTITY IN URBAN RUNOFF | MARSALEK,J. |
| | 342 | WATERFORD RIVER BASIN - NEWFOUNDLAND | MARSALEK,J. |
| | 343 | MOBILE BED RIVER FLOWS | LAU,Y.L. |
| | 344 | BED LOAD AND SUSPENDED SEDIMENT MEASURMENT | ENGEL,P. |
| | 345 | ICE JAMS AND FLOODS | BELTAOS,S. |
| | 346 | UPPER GREAT LAKES CONNECTING CHANNELS | LAU,Y.L. |
| | 347 | RIVER FLOW MEASURMENT ALTERNATIVES | DICK,T.M. & LAU,Y.L. |
| ENGINEERING SERVICES | | | |
| | 350 | N.W.R.I. ENGINEERING | ROY,F.E. |
| | 351 | NWRI PROGRAM FOR INDUSTRY LABORATORY PROJECTS (PILP) | FORD,J.S. |
| | 390 | SCIENTIFIC EQUIPMENT DEVELOPMENT | FORD,J.S. |
| MANUFACTURING AND TECHNICAL DEVELOPMENT | | | |
| | 360 | MANTEC SUPPORT TO NWRI STUDIES | BAIRD,S.D. |
| | 361 | MANTEC SUPPORT TO NON-NWRI STUDIES | BAIRD,S.D. |
| | 362 | INSTRUMENTATION CALIBRATION STANDARDS | BAIRD,S.D. |
| | 363 | COMMON USER TEST EQUIPMENT AND MATERIELS STORES | BAIRD,S.D. |
| | 369 | INSTITUTE EQUIPMENT MANUFACTURING AND MAINTENANCE | BAIRD,S.D. |
| OFFICE SERVICES | | | |
| | 370 | OFFICE SUPPORT SERVICES | HAWKINS,M. |
| | 371 | OFFICE SUPPORT SERVICES (ENGINEERING) | HAWKINS,M. |
| DRAFTING | | | |
| | 380 | DRAFTING SERVICES TO CCIW | FINN,W.D. |

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                                                      DATE RUN  85/05/23.
PROCESSING FORMB FOR DIVISION HD

    ----ORGANIZATION---- --ENGINEERING---- -----MANTEC------ ---TECH OPS.--- --DM-- ------EXTERNAL---- SHADOW ----------TOTALS----------
 NO  PY SAL    OM   CAP  PY SAL   OM  CAP  PY SAL   OM  CAP  PY SAL   OM OT PY SAL AG PY SAL    OM  CAP COST    PY SAL    OM   CAP   COST

310 1.0  33  20.0  12.0  -- --    --  --   -- --    --  --   -- --    -- -- -- --     -- --    --   --   --   1.00  39  20.0  12.0   70.7

311 1.0  39  16.0    --  -- --    --  --   -- --    --  --   -- --    -- -- -- --     -- --    --   --   --   1.00  39  16.0    --   54.7

318  -- --   85.0    --  -- --    --  --   -- --    --  --   -- --    -- -- -- --     -- --    --   --   --     --  --  85.0    --   85.0

320 3.5 135  25.0  25.0 .70 24    --  -- 1.69 57    --  --  .50 15  2.0  1 .20  7EMR -- --100.0   --        6.59 239 127.0  25.0  390.9

321 3.4 132   6.0  18.0  -- --    --  --  .05  2    --  --   -- --    -- -- .07  2EMR -- -- 50.0   --        3.52 136  56.0  18.0  209.5

322 1.5  58   2.0    -- .30 10    --  --   -- --    --  --  .10  3  4.0  3 .04  1     -- --    --   --   --   1.94  75   6.0    --   81.0

323 1.0  39   3.0    --  -- --    --  --   -- --    --  --  .10  3  1.7  1 -- --      -- --    --   --   --   1.10  43   4.7    --   47.5

324 1.0  39   4.0   8.0  -- --    --  --   -- --    --  --  .10  3  3.6  3 -- --QUE   -- --   3.0   --        1.10  44  10.6   8.0   62.8

325 1.0  39   5.0  10.0  -- --    --  --   -- --    --  --   -- --    -- -- -- --     -- --    --   --   --   1.00  39   5.0  10.0   53.7

330 1.0  39  23.0  45.0  -- --    --  --  .29  7    --  --   -- --    -- -- .02  1    -- --    --   --   --   1.22  46  23.0  45.0  114.2

331 3.0 115  10.0   7.0  -- --    --  --  .10  3    --  --   -- --    -- -- .06  2    -- --    --   --   --   3.16 121  10.0   7.0  138.5

340 3.0 116  15.5  10.0 .05  2    --  --   -- --    --  --   -- --    -- -- -- --     -- --    --   --   --   3.05 118  15.5  10.0  143.3

341  .8  29   4.5    --  -- --    --  --   -- --    --  --   -- --    -- -- -- --GLW  -- -- 10.8  3.0         .75  29  15.3   3.0   47.3

342 1.5  58   6.0    --  -- --    --  --   -- --    --  --   -- --    -- -- .08  3    -- --    --   --   --   1.58  61   6.0    --   66.6

343 4.0 155  13.0   5.0  -- --    --  --   -- --    --  --   -- --    -- -- .20  7    -- --    --   --   --   4.20 161  13.0   5.0  179.4

344 2.0  77   8.0   8.0 .18  6    --  --   -- --    --  --   -- --    -- -- .03  1    -- --    --   --   --   2.21  85   8.0   8.0  100.5

345 3.0 116  22.0  22.0 .47 16    --  --   -- --    --  --  .40 12  4.2  2 -- --      -- --    --   --   --   3.87 146  26.2  22.0  193.9

346 1.3  48   5.5   9.0  -- --    --  --   -- --    --  --   -- --    -- -- -- --     -- --    --   --   --   1.25  48   5.5   9.0   62.8

347  .3  10   2.5    --  -- --    --  --   -- --    --  --   -- --    -- -- -- --     -- --    --   --   --    .25  10   2.5    --   12.1

350  .3  10  13.0  24.6  -- --    --  --  .11  4    --  --   -- --    -- -- -- --     -- --    --   --   --    .36  13  13.0  24.6   50.9

351  .3  10   3.0    --  -- --    --  --   -- --    --  --   -- --    -- -- -- --     -- --    --   --   --    .25  10   3.0    --   12.6

360  -- --     --    --  -- --    --  --   -- --    --  --   -- --    -- -- -- --     -- --    --   --   --     --  --    --    --     --

361  -- --     --    --  -- --    --  --   -- --    --  --   -- --    -- -- -- --     -- --    --   --   --     --  --    --    --     --

362  .6  24  16.3  16.0  -- --    --  --   -- --    --  --   -- --    -- -- -- --     -- --    --   --   --    .63  24  16.3  16.0   56.6

363 1.3  50  30.4  25.0  -- --    --  --   -- --    --  --   -- --    -- -- -- --     -- --    --   --   --   1.28  50  30.4  25.0  104.9

369 1.9  74  21.3  29.0  -- --    --  --   -- --    --  --  .20  6   .5 -- -- --     -- --    --   --   --   2.12  80  21.8  29.0  131.2
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                                                       DATE RUN  85/05/23.
S FORMB FOR DIVISION HD

GANIZATION---- --ENGINEERING---- -----MANTEC------ ---TECH OPS.--- --OM-- ------EXTERNAL---- SHADOW -----------TOTALS-----------
AL     OM    CAP  PY SAL    OM   CAP  PY SAL    OM   CAP  PY SAL    OM OT PY  SAL AG PY  SAL    OM   CAP COST    PY SAL    OM    CAP   COST

77   70.0   1.0   -- --     --   --   -- --     --   --   -- --     -- -- -- --      -- --     --    --   --  2.00  77  70.0    1.0  148.4

39   20.0   1.0   -- --     --   --   -- --     --   --   -- --     -- -- -- --      -- --     --    --   --  1.00  39  20.0    1.0   59.7

55   16.0   1.0   -- --     --   --   -- --     --   --   -- --     -- -- -- --      -- --     --    --   --  4.00 155  16.0    1.0  171.8

40   14.0  18.4   -- --     --   -- 1.42 48     --   --   -- --     -- -- -- --      -- --     --    --   --  2.46  88  14.0   18.4  120.8


  480.0        1.70       --       3.57       --       1.4(   16.0    .70          --  163.8           --       2014        298.0
61       295.0       58        --        121        --        42      8.     23         --        3.0      52.89      659.8          2971.3
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| | | |
|---|---|---|
| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | Study Plan<br>Plan d'étude | NO: 85- 310 |
| STUDY TITLE/ TITRE D'ETUDE | Hydraulics Division Management and Administration | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | FINANCE, CONTROL, TRAINING, DEVELOPMENT | SECTION HDDIV<br>PAE EAP 1513 |
| STUDY LEADER/ CHEF D'ETUDE | Dick, T.M. TEL: 637-4738 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Admin. Officer, Section Heads | |
| TIME FRAME/ CALENDRIER | START DEBUT Ongoing FINISH FIN | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | Not applicable. TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To provide planning, direction coordination, liaison, and control of scientific and service projects.
2. Financial plannning and control.
3. Human resource management.

Performance Indicators/Indicateurs de rendement

1. 1.1 Long Term and Work Plans of good quality produced on schedule; 1.2 Preparation of quarterly reports for Division operations system and the NWRI Work plan; 1.3 Internal Division and NWRI support cost controls: 1.4 Program coordination activities; 1.5 Contribution to Branch management; 1.6 Plan for Technology Transfer; 1.7 Plan for Program Evaluation.
2. 2.1 PY and dollar budget control with early advice to Director of significant variances; 2.2 Preparation of financial plans.
3. 3.1 Attention to safety, health, and security programs; 3.2 Accurate and timely employee assessments; 3.3 Training and development programs; 3.4 Training and redeployment plan; 3.5 Regular staff communications.

Relevance/Objet

Expenditures for research, development, and training should be directed towards established objectives of the Department and the Institute.

09/84

FORM A, PART 1/FORMULE A, PARTIE 1

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-311

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Division Management (Support) | | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | FINANCE, CONTROL, TRAINING, DEVELOPMENT | | SECTION HDDIV<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Dick, T.M. | TEL: 637-4738 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Admin. Officer, Section Heads | | |
| TIME FRAME/ CALENDRIER | START DEBUT Ongoing FINISH FIN | | |
| PRIMARY USER/ USAGER PRIMAIRE | | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | Not applicable. | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To provide planning, direction coordination, liaison, and control of scientific and service projects.
2. Financial plannning and control.
3. Human resource management.

Performance Indicators/Indicateurs de rendement

1. 1.1 Long Term and Work Plans of good quality produced on schedule; 1.2 Preparation of quarterly reports for Division operations system and the NWRI Work plan; 1.3 Internal Division and NWRI support cost controls: 1.4 Program coordination activities; 1.5 Contribution to Branch management; 1.6 Plan for Technology Transfer; 1.7 Plan for Program Evaluation.
2. 2.1 PY and dollar budget control with early advice to Director of significant variances; 2.2 Preparation of financial plans.
3. 3.1 Attention to safety, health, and security programs; 3.2 Accurate and timely employee assessments; 3.3 Training and development programs; 3.4 Training and redeployment plan; 3.5 Regular staff communications.

Relevance/Objet

Expenditures for research, development, and training should be directed towards established objectives of the Department and the Institute.

| | | | |
|---|---|---|---|
| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | | Study Plan<br>Plan d'étude | NO: 85-318 |
| STUDY TITLE/ TITRE D'ETUDE | Applied Research and Engineering Studies | | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | DEVELOPMENT, TECHNOLOGY | | SECTION HDDIV<br>PAE EAP 1532 |
| STUDY LEADER/ CHEF D'ETUDE | Dick, T.M. | TEL: 637-4738 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Divisional Staff | | |
| TIME FRAME/ CALENDRIER | START DEBUT On-going. | FINISH FIN | |
| PRIMARY USER/ USAGER PRIMAIRE | N/A | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To provide highly specialized equipment to industry, provincial agencies, and other Federal departments.

Performance Indicators/Indicatoeurs de rendement

1. Funds recovered from clients exceed expenditures.

Relevance/Objet

The laboratories represent an investment in highly specialized facilities and staff which are conditionally made available to the private sector and other agencies in order to promote Canadian expertise and developments.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-320

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Air-Water Interaction | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | AIR-WATER INTERACTION, WAVES, TURBULENCE, MODELS, SHEAR STRESS, LAKE CIRCULATION | SECTION SHORES<br>PAE EAP 1513 |
| STUDY LEADER/ CHEF D'ETUDE | Donelan, M.A. TEL: 637-4231 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | K. Kahma, M.G. Skafel, D. Beesley | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1988 | PERD |
| PRIMARY USER/ USAGER PRIMAIRE | Panel for Energy Research and Development. TEL: 613-993--376 | OTHER USERS/ AUTRES USAGERS 2, 4, 5 |
| IWD/DGEI CONTACT | A. Ellis TEL: 613-997-1461 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To obtain, discover, or develop theories and/or models to describe and predict the interaction of wind and water, including surface waves, roughness of the interface, fluxes of mass and energy, turbulence, and wave-generated mixing.

Performance Indicators/Indicateurs de rendement

1. To complete by 15 December, 1985, a field experiment to measure spectral distribution of dissipation of waves, the orbital velocity under breaking waves, and the vertical distribution of turbulence under breaking waves.
2. To complete a laboratory experiment on the concept of full development of waves, by March 1986.
3. To develop techniques to model over-water winds using satellite data by providing advice to NASA and conducting joint experiments and developing models (by 1988).
4. To adapt the Donelan wave prediction model for shallow water by December 1985.
5. To continue analysis of laboratory tests aimed at elucidating the mechanisms for transfer of mass, momentum, and energy between air and water.

Relevance/Objet

Circulation and mixing in lakes are primarily driven by wind. Waves are important energy sources for all nearshore actions on bottom sediment and internal lake mixing. Fluxes of mass and heat are important factors in assessing environmental factors such as evaporation, heat balance, micro climates, and thermocline development.

Assessment of water temperatures and depth of the epilimnion in proposed reservoirs depends on knowing the air-water surface interaction. Energy developments and floods of waves and surges need precise information and prediction for efficient and effective design and management.

IWD Priorities: 1.7, 4.1, 4.2, 4.3, 4.4, 4.5.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-321

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Shore Conservation | | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | COASTAL ZONE, LITTORAL ZONE, MARINAS, MODELS, SHORELINE, WAVES, ENERGY PRODUCTION, EROSION | | SECTION SHORES<br>PAE EAP 1513 |
| STUDY LEADER/ CHEF D'ETUDE | Skafel, M.G. | TEL: 637-4736 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | C.T. Bishop, J.P. Coakley | | |
| TIME FRAME/ CALENDRIER | START DEBUT 1984 FINISH FIN 1989 | | PERD |
| PRIMARY USER/ USAGER PRIMAIRE | Panel on Energy Research & Development (PERD), EPS' SCH | TEL: 613-993-3760 | OTHER USERS/ AUTRES USAGERS<br>2 |
| IWD/DGEI CONTACT | E. Langley | TEL: 902-426-3266 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To develop methods and theories to permit prediction of littoral zone changes including environmental assessments and to address specific environmental and developmental requirements of clients in the public and private sectors.

Performance Indicators/Indicateurs de rendement

1. To develop a numerical procedure to prepare wave climates for specific sites based on AES wind data, and prepare a report by December, 1985.
2. To complete the investigations on the design of caisson-retained artificial islands and report findings at the Canadian Coastal Conference 1985 (PERD).
3. To determine limitations of shoreline evolution models, acquired in 84-85, by March 1986.

Relevance/Objet

Heritage lands, national parks, and other valuable lands require policies and practices to predict changes in shore regime caused by developments or by change. Environmental impact assessment requires that changes in the littoral zone be described quantitatively. Similar requirements are necessary for assessment of applications for development under the Navigable Waters Protection Act. Costs incurred to mitigate loss of historically or culturally important lands should be efficient, environmentally compatible, and aesthetically acceptable.

IWD Priority: 1.3, 1.7, 4.2, 4.3, 4.4, 4.5

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-322

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Littoral and Fluvial Sedimentology and Geotechnique | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | COASTAL ZONE, EROSION, SEDIMENTS, RIVERS, RESERVOIRS | SECTION SHORES<br>PAE EAP 1513 |
| STUDY LEADER/ CHEF D'ETUDE | Coakley, J.P. TEL: 637-4248 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | N. Rukavina, A. Zeman, M. Skafel, A.G. Bobba | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1, 1984 FINISH FIN March 1989 | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | K. Wiebe, WRP TEL: 613-997-1934 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To contribute data, advice, and analysis to assist the planning, developing, and rehabilitating of the shores and continent areas of large lakes.
2. To investigate the rates and processes of erosion and sedimentation in lakes, reservoirs and rivers and to obtain quantitative relationships suitable for predictive models.

## Performance Indicators/Indicateurs de rendement

1. Report on relationship between hydrodynamic forces, erodibility, soil properties, and bottom erosion, by March 1986.
2. Prepare report on erosion in reservoirs from literature by March 1986.
3. Organize a symposium on cohesive shores to be held at CCIW in the spring of 1986.
4. Critically evaluate and report on testing of remolded cohesive samples in the erodibility apparatus by March 1986.

## Relevance/Objet

Nearshore development projects such as pipelines, marinas, water intakes, and outfalls require basic data for assessment. Possible diversion of Great Lakes basin waters and increasing consumptive use will affect the regime of nearshore zone. Assessments of the impact of water level changes of any lake or reservoir requires a model or theory to predict effects on the erodible shores.

IWD Priorities: 1.3, 1.7, 4.2, 4.3, 4.4, 4.5

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Study Plan
Plan d'étude

NO: 85-323

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Dynamics of Sediments – Toronto Harbour | DIVISION HD |
| | | SECTION SHORES |
| KEY WORDS/ MOTS CLEFS | SEDIMENTS, TOXICS, BEACHES, WATER QUALITY | PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Coakley, J.P. TEL: 637-4248 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | A. Mudroch | |
| TIME FRAME/ CALENDRIER | START DEBUT April, 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | D. Persaud, MOE<br>GLWQA<br>TEL: | OTHER USERS/ AUTRES USAGERS MOE |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To monitor and predict the transport, suspension, and deposition of sediments and associated toxic elements in Toronto Harbour.

Performance Indicators/Indicateurs de rendement

1. Prepare interim report on tracing movement of fine sediments in the vicinity of Toronto Harbour by March, 1986.

Relevance/Objet

Transfer of toxic substances in Toronto Harbour by wave currents is unknown in extent and rate. Information is required to assess impact of dumped dredge spoil.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85-324

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Sedimentology, Lower Great Lakes - Lac St. Louis | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | SEDIMENTS, TOXICS, WESTERN BASIN, LAKE ERIE, SILT CLAY, LAKE ONTARIO, LAKE HURON, LAC ST. LOUIS | SECTION SHORES<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Rukavina, N.A. TEL: 637-4247 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | GLWQA<br>Quebec Region IWD TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | H. Sloterdijk TEL: (514) 283-3916 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To survey, interpret and record the occurrence, distribution and history of Lake and River Sediments.

## Performance Indicators/Indicaterus de rendement

1. Produce sediment summaries and interpretative reports for the lower Great Lakes with priority to Western Lake Erie by March 1986.
2. Report on survey of Lake St. Louis to support St. Lawrence River Studies by October 1985.

## Relevance/Objet

Toxic substances are attached to fine sediments. Interpretation of the distribution and concentration of toxics is greatly improved with sedimentological analysis.

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Study Plan
Plan d'étude

NO: 85-325

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Shore Developments | DIVISION HD |
| | | SECTION SHORES |
| KEY WORDS/ MOTS CLEFS | COASTAL ZONE, LITTORAL ZONE, EROSION | PAE EAP 1532 |
| STUDY LEADER/ CHEF D'ETUDE | Skafel, M.G. TEL: 637-4736 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | C.T. Bishop | |
| TIME FRAME/ CALENDRIER | START DEBUT 1984 FINISH FIN 1989 | |
| PRIMARY USER/ USAGER PRIMAIRE | Small Craft Harbours F&O, D.P.W., E.P.S. TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To guide and advise on developments in the nearshore zone for clients in the public and private sector.

Performance Indicators/Indicateurs de rendement

1. To report on the scale effect on wave attenuation by rubble lined channel walls by August 1985.
2. To monitor harbour development at Goderich to determine effects on the shoreline. Report in 1987.
3. Provide advice and conduct specific studies as required to support policy of sustainable and appropriate development of shores.

Relevance/Objet

Heritage lands, national parks, and other valuable lands require policies and practices to predict changes in shore regime caused by developments or by change. Environmental impact assessment requires that changes in the littoral zone be described quantitatively. Similar requirements are necessary for assessment of applications for development under the Navigable Waters Protection Act. Costs incurred to mitigate loss of historically or culturally important lands should be efficient, environmentally compatible, and aesthetically acceptable.

IWD Priority: 1.3, 1.7, 4.2, 4.3, 4.4, 4.5

09/84

FORM A, PART 1/FORMULE A, PARTIE 1

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Study Plan
Plan d'étude

NO: 85- 330

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Laboratory Services | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | SEDIMENTS, SUPPORT, HYDRAULICS | SECTION TCSRVS<br>PAE EAP 1513 |
| STUDY LEADER/ CHEF D'ETUDE | DeZeeuw, C. TEL: 637-4733 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | G. Duncan, G. Voros, K. Salisbury | |
| TIME FRAME/ CALENDRIER | START DEBUT FINISH FIN Ongoing. | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | C.P. Robinson, WRB, P&YR TEL: 606-666-3858 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To provide expert technical support staff and fully operational laboratories and equipment for hydraulic and geotechnical research and related activities.

To provide for a safe working environment and safe practices.

Performance Indicators/Indicateurs de rendement

Staff performance will be reviewed regularly and reported on quarterly.

A quarterly report on laboratory equipment acquisitions, repairs, and replacements will be prepared and reviewed.

Regular reports and actions taken on Safety Committee recommendations.

Preventative maintenance program will be updated and reported on quarterly.

Inventory of equipment will be checked, worn out equipment will be written off. Capital plan prepared to replace and update equipment.

Relevance/Objet

Overall efficiency and the effectiveness of the Division, as well as other groups supported by Technical Services, depends on a cohesive, expert section which also maintains and develops laboratory equipment and facilities.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 331

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | National Calibration Service | | |
| KEY WORDS/ MOTS CLEFS | OPEN CHANNEL FLOW, STREAMS, NATIONAL STANDARDS, RIVERS, CALIBRATION, CURRENT METER | | |
| STUDY LEADER/ CHEF D'ETUDE | DeZeeuw, C. | TEL: | 637-4733 |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | D. Fekyt, C. Bil, B. Near | | |
| TIME FRAME/ CALENDRIER | START DEBUT 1981 | FINISH FIN | Ongoing. |
| PRIMARY USER/ USAGER PRIMAIRE | Water Survey of Canada | TEL: | |
| IWD/DGEI CONTACT | Mr. P.I. Campbell. | TEL: | 613-997-1474 |

| | |
|---|---|
| DIVISION | HD |
| SECTION | TCSRVS |
| PAE EAP | 1430 |
| SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE | |
| OTHER USERS/ AUTRES USAGERS | |
| INTEREST/INTERET DIRECT-GENERAL | |

Goal/But

Calibration and performance testing of water current meters, sediment measuring apparatus, and other hydrometric equipment used for data collection purposes.

Performance Indicators/Indicateurs de rendement

1. Responsive and prompt attention is required for all requests for work or information.

2. Quarterly reports are required summarizing the work accomplished, including clients' names, as well as receipt and completion dates of jobs.

3. Feedback from clients such as Water Survey of Canada.

Relevance/Objet

To ensure that current meter systems and flow measuring systems measure correctly and to a known precision.

Assessment of water resources or evaluation of theories to predict flow of water, movement of sediment, or pressure gradients requires instruments of known performance and calibration.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85-340

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Frazil and Anchor Ice Studies | | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | FRAZIL, ANCHOR ICE, HYDRAULICS, FLOWING WATER, POWER, PRODUCTION, PROPERTIES, RESISTANCE, FRESH WATER, SEAWATER | | SECTION EHS<br>PAE EAP 1513 |
| STUDY LEADER/ CHEF D'ETUDE | Tsang, G. | TEL: 637-4622 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | | |
| TIME FRAME/ CALENDRIER | START DEBUT | FINISH FIN | |
| PRIMARY USER/ USAGER PRIMAIRE | Hydro-Québec (P. Desroches)<br>Water Survey of Canada (K Wiebe) | TEL: 514-289-5228<br>819-997-1934 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To develop theories and methods to predict the distribution of frazil ice, and the effect of frazil, anchor ice, and hanging dams on river flows.

Performance Indicators/Indicateurs de rendement

1. Analyze data and write report by November 1985, on the effect of frazil on the conveyance capacity of channels using data from the Beauharnois Canal.
2. Complete analysis of frazil ice and anchor ice using 84/85 Lachine Rapids data and write report on hydraulic effects of ice formation on Hydro-Québec's Archipel project by March 1986. Gather further data if necessary in winter of 85/86.
3. Conduct laboratory experiments on frazil formation by November 1985. Write report on formation and control of frazil by March 1986.

Relevance/Objet

Frazil ice can change the flow resistance in a river and affect the water level. It creates anchor ice and hanging dams which can cause flooding. It also causes problems by adhering to water intake structures. However, very little is known about frazil production and nothing about its distribution in rivers. The effects of frazil on flows may be different when the water salinity changes, such as in the St. Lawrence Estuary.

Frazil ice production is a major consequence of extending navigation seasons in the St. Lawrence connecting channels. It may also be a major factor downstream of dams where the winter discharge is changed.

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|---|---|---|
| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | Study Plan<br>Plan d'étude | NO: 85- 341 |
| STUDY TITLE/ TITRE D'ETUDE | Water Quality and Quantity in Urban Runoff | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | URBAN RUNOFF, WATER QUALITY, MODELS, FLOODING, FLOOD DAMAGE REDUCTION | SECTION EHS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Marsalek, J. TEL: 637-44329 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | H. Ng, Urban Water Resources Research Council (ASCE), UNESCO Working Group on Urban Hydrology. | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | S. Moin, WP&M, Ont. Region TEL: 637-4711 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To develop and refine models for urban runoff quantity and quality. To develop methods for controlling urban runoff quality.

To assist in the international technology transfer and training under the UNESCO program.

Performance Indicators/Indicateurs de rendement

1. Write an interpretive report on runoff quality in two urban test catchments by March 1986, including toxic metals such as Lead, Zinc, Mercury, Cadmium, Arsenic, and Copper.
2. Prepare the technical program for an international workshop on urban runoff quality (collaborating agencies: ASCE, NATO, and the French Government) by September, 1985. The water quality parameters include organic toxics and metals (Priority Pollutants).
3. Undertake technical editing of two UNESCO manuals of urban drainage and data collection, by March, 1986.

Relevance/Objet

Urbanization alters the volume and quality of the runoff discharged into the receiving waters. Management of the environment and multiple resource conservation require that the runoff processes be understood so that predictions of urbanization effects can be made and remedies devised. The runoff quality data are also used by IJC. The international technology transfer and training work have been requested by UNESCO and the Canadian Committee for the International Hydrological Program. Data and analysis on Toxics are relevant to the TCMP.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 342

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Waterford River Basin - Newfoundland | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | RIVERS, RUNOFF, WATER QUALITY, NEWFOUNDLAND, TRANSPORT, URBANIZATION | SECTION EHS<br>PAE EAP 1513 |
| STUDY LEADER/ CHEF D'ETUDE | Marsalek, J. TEL: 637-4329 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | H. Ng., Tecnical Committee for Waterford River Study. | |
| TIME FRAME/ CALENDRIER | START DEBUT 1981 FINISH FIN 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | IWD Atlantic Region, WP&MB TEL: 426-3266 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | D.A. Smith, WP&M, Dartmouth, NS. TEL: 426-3266 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Set up and calibrate a continuous model of the hydrological response of the urbanizing basin.

2. Report on impacts of urbanization on water quality and quantity in the basin in the preliminary and final reports by 1986 and 1987, respectively.

Performance Indicators/Indicateurs de rendement

1. Preliminary report on impacts of urbanization on water quality and quantity in the basin, by 1986.

2. Final report on impacts of urbanization, by 1987.

3. Calibrated model of the hydrological response of the basin, by 1987.

Relevance/Objet

The progressing urbanization of the Waterford Basin changes the surface water quality and quantity. The effects of urbanization need to be investigated in order to develop guidelines for effecive management of water resources in the basin. The study is jointly sponsored by DOE and the Province of Newfoundland. The involvement of the Hydraulics Division has been requested by SDG, IWD, and the Director of IWD-Atlantic Region.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 343

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Mobile Bed River Flows | DIVISION HD |
| | | SECTION EHS |
| KEY WORDS/ MOTS CLEFS | RIVERS, BED FORMS, BED LOAD, FLOODING, DIVERSIONS, MIXING, MODELS, SEDIMENTS | PAE EAP 1513 |
| STUDY LEADER/ CHEF D'ETUDE | Lau, Y.L. TEL: 637-4327 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | B.G. Krishnappan, P. Engel | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | NWRI |
| PRIMARY USER/ USAGER PRIMAIRE | T.J. Day, WRB-HQ TEL: 997-1185 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | A. Ellis, WP&M-HQ. TEL: 997-1461 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

Develop and improve theories and models to predict the transport and distribution of sediment and water in alluvial rivers; the changes caused by developments such as dams and diversions; and the distribution of water quality parameters in river flows. Develop methods to alleviate the adverse effects.

## Performance Indicators/Indicateurs de rendement

1. Report on the extension of MOBED to include the effects of armouring, by March 1986.
2. Report on comparison of HEC-6 and MOBED, using new data supplied by Water Survey of Canada, by March 1986.
3. Development of numerical scheme to expand MOBED to include predictions of lateral channel movement, by January 1986. Develop computer code, by July 1986.
4. Report on experiments of flow resistance of alluvial channels, by March 1986.
5. Complete experiments on response time of sand waves to unsteady flow conditions, by March 1986.
6. Report on the investigation of methods to account for side wall effects in flume experiments, by March 1986.
7. Construction of experimental equipment for studying flows in meandering channels with top cover, by May 1986.
8. Initiate a CSCE task group on mathematical models of river flows by May 1985. Install various models on CCIW computer by March 1986.

## Relevance/Objet

Development of river basins can have drastic effects on river behaviour. To model such changes, flow and sediment transport in alluvial rivers must first be understood. Extensions of the MOBED model for predicting lateral shifting, bank erosion, lateral distribution of velocity and flow depths etc., will be useful for estimating effects of diversions, cutoffs, and other engineering works. Predicting the mixing of substances is important, especially when environmentally sensitive areas such as the Upper Great Lakes connecting channels are concerned.

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Study Plan
Plan d'étude

NO: 85- 344

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Bed Load and Suspended Sediment Measurement | DIVISION HD |
| | | SECTION EHS |
| KEY WORDS/ MOTS CLEFS | BED LOAD, SUSPENDED SOLIDS, SEDIMENTS, GRAIN SIZE | PAE EAP 1513 |
| STUDY LEADER/ CHEF D'ETUDE | Engel, P. TEL: 637-4737 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Y.L. Lau, B.G. Krishnappan | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | T.J. Day, WRB - HQ TEL: 997-1185 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | B.L. Tassone, WRB-P&YR TEL: 666-6207 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To develop theories, models, and methods to measure and predict sediment transport by bed load and suspended sediments in rivers.

Performance Indicators/Indicateurs de rendement

1. Report on comparison of different techniques of estimating dune velocity, by March 1986.
2. Report on calibration of Helley-Smith bed load sampler, by December 1985.
3. Report on experiments of sediment transport rate, by March 1986.

Relevance/Objet

Sediments can be carried in suspension or can move as bed load. Suspended sediments can carry and distribute pollutants and are an important concern in many environmental issues. Accurate measurements of sediment loads are important for estimating life spans of reservoirs, river dredging requirements, etc. Efficient methods of sediment measurement can significantly reduce survey costs. Sediment bed loads can significantly affect water intakes in rivers as well as changing roughness to increase flood levels.

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Study Plan
Plan d'étude

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Ice Jams and Floods | NO: 85- 345 |
|  |  | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | DATA, RIVERS, ICE BREAKUP, MODELS | SECTION EHS |
|  |  | PAE EAP 1513 |
| STUDY LEADER/ CHEF D'ETUDE | Beltaos, S. TEL: 637-4329 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J. Wong |  |
| TIME FRAME/ CALENDRIER | START DEBUT FINISH FIN |  |
| PRIMARY USER/ USAGER PRIMAIRE | Flood Damage Reduction Program; (NRC Subcommittee on River Ice); NRCC Working Group on River Ice Jams; Lower Thames Valley Conservation Authority( J. Robertson-519-354-7310); Grand River Conservation Authority (Ms. L. Marshall-519-621-2761). TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To develop theories and models for ice jams and ice breakup, and develop methods to improve the management of ice-covered rivers to reduce flooding.

85/86- Obtain field observations in Thames and Grand River sites of ice jams and their effects.

- Develop a model ice material for laboratory studies of ice jam removal.
- Expand development of mathematical model of ice jams to include variable channel width.
- Write Chapter: "Ice Jam Theory" for Monograph on Ice Jams by NRCC Working Group.
- Provide advise on RUSHOON Hydrotechnical study.

Performance Indicators/Indicateurs de rendement

1. Two progress reports on ice jam observations, by March 1986.
2. Progress report on model ice material and initial tests.
3. Report: "Ice Jam Theory" for NRCC Working Group on Ice Jams Monograph by Jan. 1986.
4. Report on mathematical model of ice jams - variable width case by March, 1986.

Relevance/Objet

Ice jams constitute a flooding threat which is difficult to quantify at present. In addition, the inter-basin transfer of water and the installation of hydro power all require an assessment of the change in the ice regime. IWD Atlantic Region has been requesting advice on ice problems in various rivers since 1981 (letter attached).

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Study Plan
Plan d'étude

NO: 85- 346

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Upper Great Lakes Connecting Channels | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | ST. CLAIR RIVER, LAKE ST. CLAIR, SEDIMENTS, TOXIC CHEMICALS, NUTRIENTS, URBAN RUNOFF | SECTION EHS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Lau, Y.L. TEL: 637-4327 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J. Marsalek, B.G. Krishnappan | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1, 1985 FINISH FIN March 31, 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | GLWQ Toxics Committee<br>UGLCC Management Committee, RDG Ont. Region<br>TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

Determine monthly and annual loadings of selected toxic chemicals and nutrients in urban runoff from areas adjacent to St. Clair River and Lake St. Clair, and annual urban runoff loadings in the entire drainage basin.

Determine the transport of bed sediments as bed load and suspended load in the St. Clair River.

Performance Indicators/Indicateurs de rendement

1. Establish study area characteristics and select monitoring sites, by July 85.
2. Sample collection for surface runoff, combined sewer overflows, snow melt and street sediments.
3. Simulate runoff flows at selected points of discharge.
4. Produce estimates of monthly and annual loadings of toxic chemicals and nutrients in urban runoff from the study area by March 1987.
5. Investigate the nature of available hydraulic data of St. Clair River and decide whether these are adequate for the preparation of input data to model MOBED. If available data are found inadequate, set up a field measurement program to collect the necessary data by July 1985.
6. Complete the preparation of input data to model MOBED by March 1986.
7. Run MOBED, analyze results, and write report by December 1986.

Relevance/Objet

The St. Clair River and Lake St. Clair have been designated as classified areas of concern by the IJC, and a study has been initiated to determine the ecosystem trends in this area. The loadings of contaminants are required in order to define the sources of contaminant input to the area. Toxic material may be transported along with bottom sediments and their rate of transport has to be determined.

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Study Plan
Plan d'étude

NO: 85- 347

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | River Flow Measurement Alternatives | DIVISION HD |
| | | SECTION EHS |
| KEY WORDS/ MOTS CLEFS | MILK RIVER, OTONABEE RIVER | PAE EAP 1513 |
| STUDY LEADER/ CHEF D'ETUDE | Dick, T. M./Lau, Y.L. TEL: 637-4738 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Y.L. Lau, M.A. Donelan, F. Roy<br>S. Baird, P. Engel | |
| TIME FRAME/ CALENDRIER | START DEBUT FINISH FIN 1986 | A |
| PRIMARY USER/ USAGER PRIMAIRE | Water Survey of Canada TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | B. Davies, N. James TEL: Direct | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To evaluate alternative systems and to devise practical solutions to locations where conventional flow measurement systems are unsatisfactory.

Performance Indicators/Indicateurs de rendement

1. Review alternatives and prepare an interim progress report on gauging at East Crossing, Milk River, Alberta, by June 1986.
2. Where feasible, prepare laboratory working models and report by September 1985 on recommended method.
3. Visit the Otonabee River, site of acoustic measurement and obtain information on installation from WSC, Ontario Region, by August 1, 1985.

Relevance/Objet

Heavy sediment discharge, ice, and backwater effects all make discharge measurements unreliable. Accurate measurements are required for planning and anlysis of river systems for the development of water resources.

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|---|---|---|
| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | Study Plan<br>Plan d'étude | NO: 85- 350 |
| STUDY TITLE/<br>TITRE D'ETUDE | N.W.R.I. Engineering | DIVISION HD |
| KEY WORDS/<br>MOTS CLEFS | ENGINEERING SUPPORT, SYSTEMS, SENSORS, ELECTRONICS, OPTICS | SECTION ENSRVS<br>PAE<br>EAP 1516 |
| STUDY LEADER/<br>CHEF D'ETUDE | Roy, F.E. TEL: 637-4280 | SUPPLEMENTAL RESOURCES/<br>FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/<br>MEMBRES D'EQUIPE | ENSRVS Section | |
| TIME FRAME/<br>CALENDRIER | START/DEBUT April 1, 1985 FINISH/FIN March 31, 1986 | |
| PRIMARY USER/<br>USAGER PRIMAIRE | NWRI and other DOE units at CCIW. TEL: | OTHER USERS/<br>AUTRES USAGERS |
| IWD/DGEI<br>CONTACT | NWRI Division Chiefs<br>NWRI Director TEL: | INTEREST/INTERET<br>DIRECT-GENERAL |

Goal/But

1. To develop systems and equipment required for scientific measurement, sample collection, and data analysis for environmental research and operational surveys.
2. To publish results of engineering studies.

Performance Indicators/Indicateurs de rendement

1. Satisfy clients requesting engineering support in Department of Environment.
2. Calibrate and update optics laboratory equipment as required.
3. Improve analytical and engineering efficiency by further development of computer assisted design system by December 1985.
4. Write reports and papers for publication in trade and learned journals.

Relevance/Objet

Efficient and effective environmental research demands up-to-date systems and equipment for sensing, data acquisition, and analysis. Highly specialized knowledge required for this engineering support is not readily available elsewhere.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

| | | |
|---|---|---|
| | | NO: 85- 351 |
| STUDY TITLE/ TITRE D'ETUDE | NWRI Program for Industry Laboratory Projects (PILP) | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | PROGRAM FOR INDUSTRY LABORATORY PROJECTS, TECHNOLOGY TRANSFER | SECTION ENSRVS<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Ford, J.S. TEL: 637-4293 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | R. Desrosiers, J. Valdmanis, F. Roy | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | DOE/PILP Project Manager, J.R. Rousseau 997-2706 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To identify instrument or system developments which have general private sector market potential and inform DOE/PILP Evaluation Committee.

To support the transfer of technology to selected PILP contractors through the supply of relevant specifications, documentation, and consulting services, on both on-going and new items.

Performance Indicators/Indicateurs de rendement

1. Provide prompt advice to the DOE/PILP Project Manager.
2. Provide information, advice and consultation to selected PILP contractors in accordance with schedules established by the DOE/PILP Project Manager.
3. Provide industrial liaison and marketing of available technology to improve the effectiveness of Departmental technology transfer programs.
4. Collaborate with Moniteq Contribution.
5. Make three proposals to Ottawa, namely: Wave Direction & Met Buoy, Lighweight Corer, and PCB Biotechnology.

Relevance/Objet

This study responds to DOE policy supporting the efficient transfer of technology developed at NWRI to Canadian industry for commercial exploitation.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 360

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Mantec Support to NWRI Studies | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | INSTRUMENTATION, TECHNOLOGY, DESIGN, DEVELOPMENT | SECTION MANTEC<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Baird, S.D. TEL: 637-4709 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | MANTEC Staff | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN On-going | |
| PRIMARY USER/ USAGER PRIMAIRE | NWRI Scientific Staff TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | Director, NWRI TEL: 637-4265 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To provide manufacturing, technical development, consultation, and components and accessories in support of NWRI studies.

## Performance Indicators/Indicateurs de rendement

### FY 85/86

1. Respond to requests quickly and resourcefully with few complaints from clients.
2. Prepare project proposals and estimates which are realistic.
3. Keep and maintain accurate records of costs and time.

## Relevance/Objet

Specialized scientific apparatus are designed and manufactured to keep abreast of technology in support of the collection and analysis of scientific data.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

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|---|---|
| NO: | 85-361 |
| DIVISION | HD |
| SECTION | MANTEC |
| PAE EAP | 1516 |
| SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE | NWRI |
| OTHER USERS/ AUTRES USAGERS | |
| INTEREST/INTERET DIRECT-GENERAL | |

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Mantec Support to Non-NWRI Studies | |
| KEY WORDS/ MOTS CLEFS | INSTRUMENTATION, TECHNOLOGY, DESIGN, DEVELOPMENT | |
| STUDY LEADER/ CHEF D'ETUDE | Baird, S.D. | TEL: 637-4709 |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | All Mantec Staff | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 | FINISH FIN On-going |
| PRIMARY USER/ USAGER PRIMAIRE | Various IWD and other Government Dept. Divisions. | TEL: |
| IWD/DGEI CONTACT | | TEL: |

Goal/But

To provide manufacturing, technical development, consultation, and components and accessories in support of non-NWRI studies.

Performance Indicators/Indicateurs de rendement

FY 85/86

1. Requests for services are undefined. Work requests are on a day-to-day basis with no fiscal year plan.
2. Keep and maintain accurate records of cost and time.

Relevance/Objet

Specialized scientific apparatus are desiged and manufactured to keep abreast of technology in support of the collection and analysis of scientific data.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-362

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Instrumentation Calibration Standards | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | CALIBRATION, INSTRUMENTATION, MAINTENANCE, METEOROLOGY, STANDARDS. | SECTION MANTEC<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Baird, S.D. TEL: 637-4709 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | L. Peer, J. Cooper, J. Dolanjski, M. Pedrosa R. Boucher, H. Savile | |
| TIME FRAME/ CALENDRIER | START DEBUT April, 1985 FINISH FIN On-going | |
| PRIMARY USER/ USAGER PRIMAIRE | NWRI - General. TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To maintain calibration standards, systems, and sensors of the laboratory, to maintain traceability to national and international standards of the National Research Council of Canada and the National Bureau of Standards of the U.S.A.

## Performance Indicatos/Indicateurs de rendement

1. To maintain laboratory membership in the National Conference of Standards Laboratories (NCSL).
2. To obtain laboratory accreditation by the Standards Council of Canada (SCC) for temperature, presssure, and humidity calibrations within FY 85/86, and work towards accreditation for all other standards of the laboratory in FY 86/87.
3. To maintain and improve where possible the quality of calibrations by updating procedures and equipment to meet both modern technology and new parameter demands by clients.
4. To provide training to staff to keep them abreast of the technology of equipment and procedures.
5. To obtain by procurement, minor capital equipment to improve the efficiency of the laboratory.

## Relevance/Objet

Scientific data collection equipment must be calibrated to determine the accuracy of the measure, for the validity of the data, and for the intercomparison of historical data. Traceability of standards allows for correlation of data from other institutes and services.

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| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | Study Plan<br>Plan d'étude | NO: 85-363 |
| STUDY TITLE/ TITRE D'ETUDE | Common User Test Equipment and Materiels Stores | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | MATERIEL MANAGEMENT, PROCUREMENT, STORES, METALS | SECTION MANTEC<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Baird, S.D. TEL: 637-4709 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Mantec Staff | |
| TIME FRAME/ CALENDRIER | START DEBUT April, 1985 FINISH FIN On-going | |
| PRIMARY USER/ USAGER PRIMAIRE | NWRI - General TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To provide clients and MANTEC with a common user loan service of test equipment, tools, and data recorders. To provide clients and MANTEC with materiel stores of electrical, electronic, mechanical and metalurgical parts and products, on a cost-recovery basis.

Performance Indicators/Indicateurs de rendement

1. To report on a quarterly basis on client utilization of the service and produce a statistical record of material and test equipment usage.
2. To provide the service of parts and equipment to clients in an expeditious manner.
3. To assist in centralizing the storing and procurement of operational and design parts. This centralization would lead to a more efficient use of procurement funds and personnel utilization in the Institute.
4. To assist in centralizing of test equipment will lead to a more efficient use ratio of low use equipment and to substantial savings of funds in procurement of such equipment.

Relevance/Objet

Test equipment (low use) and parts are procured by various clients in anticipation of use. Hence, many items are duplicated throughout the Institute. This service is foreseen as a cost-saving on inventory, manpower saving, and immediate availability of equipment and parts.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

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|---|---|---|
| | | NO: 85- 369 |
| STUDY TITLE/ TITRE D'ETUDE | Institute Equipment Manufacturing and Maintenance | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | FIELD SUPPORT, INSTRUMENTATION, MAINTENANCE, WORKSHOP, METALS | SECTION MANTEC<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Baird, S.D. TEL: 637-4709 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | All Mantec staff | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN On-going | |
| PRIMARY USER/ USAGER PRIMAIRE | NWRI - General TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To provide clients with a prototype manufacturing source for electronic and mechanical equipment; to provide an in-shop and field service source for scientific data collection and operational equipment.

## Performance Indicators/Indicateurs de rendement

1. To maintain manufacturing machines, equipment, workshops, laboratories, and facilities in an up-to-date condition to ensure the highest quality of service.
2. To keep personnel trained in the most modern techniques to provide for the most up-to-date level of quality and the highest production.
3. To acquire by procurement, new machinery and equipment to assist in meeting the production goals of the Section.
4. To provide for a safe working environment and maintain the equipment in a safe, operative condition.

## Relevance/Objet

Scientific prototype equipment must be manufactured and maintained under strict controls to enable the collection of data of the highest quality.

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|---|---|---|---|
| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | | Study Plan<br>Plan d'étude | NO: 85- 370 |
| STUDY TITLE/ TITRE D'ETUDE | Office Support Services | | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | ADMINISTRATION, DATA COLLECTION | | SECTION OFSRVS<br>PAE EAP 1513 |
| STUDY LEADER/ CHEF D'ETUDE | Hawkins, M. | TEL: 637-4267 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>NWRI |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | D. Bowman, N. Snelling | | |
| TIME FRAME/ CALENDRIER | START DEBUT On-going | FINISH FIN | |
| PRIMARY USER/ USAGER PRIMAIRE | General Users - NWRI | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | N/A | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To produce, edit, distribute and archive reports and publications, meeting specified quality, in both official languages.
2. To respond expeditiously to requests for reports and reprints and to keep records of such requests.
3. To provide efficient and effective services to Division for word processing, financial controls and records, and office equipment.
4. To provide general support to other Sections by assisting with seminars, meetings, and translations.
5. To maintain files of Shore Erosion Data (SLEDS) and respond to requests.

Performance Indicators/Indicateurs de rendement

- A report on production is filed quarterly. Samples of reports assessed for quality and format.
- Report on requests, including statistics of origins of requests, is submitted quarterly.
- Weekly reviews at Divisional meetings do not reveal lack of service.

Relevance/Objet

Effective communication of research accomplishments in both languages is essential to realize the benefits from the investment of time and money. Responsive and quick actions to requests for information and data improve and maintain good relations with clients and customers. Overall Divisional efficiency and effectiveness are improved.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85-371

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Office Support Services (Engineering) | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | ADMINISTRATION, DATA COLLECTION | SECTION OFSRVS<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Hawkins, M. TEL: 637-4267 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>NWRI |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | D. Bowman, N. Snelling | |
| TIME FRAME/ CALENDRIER | START DEBUT On-going FINISH FIN | |
| PRIMARY USER/ USAGER PRIMAIRE | General Users - NWRI TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | N/A TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To produce, edit, distribute and archive reports and publications, meeting specified quality, in both official languages.
2. To respond expeditiously to requests for reports and reprints and to keep records of such requests.
3. To provide efficient and effective services to Division for word processing, financial controls and records, and office equipment.
4. To provide general support to other Sections by assisting with seminars, meetings, and translations.
5. To maintain files of Shore Erosion Data (SLEDS) and respond to requests.

Performance Indicators/Indicateurs de rendement

- A report on production is filed quarterly. Samples of reports assessed for quality and format.
- Report on requests, including statistics of origins of requests, is submitted quarterly.
- Weekly reviews at Divisional meetings do not reveal lack of service.

Relevance/Objet

Effective communication of research accomplishments in both languages is essential to realize the benefits from the investment of time and money. Responsive and quick actions to requests for information and data improve and maintain good relations with clients and customers. Overall Divisional efficiency and effectiveness are improved.

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Study Plan
Plan d'étude

NO: 85-380

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|---|---|---|---|
| **STUDY TITLE/ TITRE D'ETUDE** | Drafting Services to CCIW | | **DIVISION** HD |
| **KEY WORDS/ MOTS CLEFS** | DRAFTING, ILLUSTRATING, PHOTOGRAPHY, VISUAL AIDS, REPROGRAPHICS | | **SECTION** DRFTG<br>**PAE EAP** 1516 |
| **STUDY LEADER/ CHEF D'ETUDE** | Finn, W.D. | **TEL:** 637-4278 | **SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE** |
| **TEAM MEMBERS/ MEMBRES D'EQUIPE** | M. Donnelly, P. McColl, J. Van Nynatten<br>Contract | | |
| **TIME FRAME/ CALENDRIER** | **START DEBUT** On-going | **FINISH FIN** | |
| **PRIMARY USER/ USAGER PRIMAIRE** | | **TEL:** | **OTHER USERS/ AUTRES USAGERS** |
| **IWD/DGEI CONTACT** | | **TEL:** | **INTEREST/INTERET DIRECT-GENERAL** |

Goal/But

- To provide drafting and illustrating services that include cartographic, scientific and technical illustration and graphic art as required for publication purposes and media activities.
- To provide photographic and reprographic services that include photography, slide and overhead projection transparencies and photo-reproductions.
- To provide occasional mechanical and architectural drafting services on shop layout, plan and detail drawings.

Performance Indicators/Indicateurs de rendement

Provide a quarterly report on the work done and statistics of work load, including photographic support.

Relevance/Objet

High quality illustrations, drawings, photographs and slides are essential so that scientists and engineers at CCIW are able to communicate more effectively through their reports, publications, and presentations. A drafting and photographic service improves the overall efficiency of the Institute and CCIW.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85-390

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Scientific Equipment Development | DIVISION HD |
| KEY WORDS/ MOTS CLEFS | INSTRUMENT DEVELOPMENT, EQUIPMENT, DEVELOPMENT | SECTION ENSRVS<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Ford, J.S. TEL: 637-42393 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | ENSRVS Staff | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1, 1985 FINISH FIN March 31, 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | NWRI Scientific Equipment Development Working Group (SEDWG) TEL: 637-4293 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | Head, Hydrometrics Methods Section TEL: 613-997-1934<br>WSC/WRB: K. Wiebe | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To design and develop new concepts for research support equipment and apparatus identified by SEDWG as having significant potential for improving the efficiency and quality of work at NWRI.

## Performance Indicators/Indicateurs de rendement

1. To complete work on seven (7) projects listed on Parts 2 & 3 in accordance with work schedules agreed to with SEDWG.
2. Report quarterly on project status relative to the agreed plans and schedules.

Note: List of projects 1 January 1985 is as follows:

1. Multilogger
2. Ultrasonic Power Supply
3. Benthic Array
4. Sampler Developments
5. Shipboard Sampler
6. Mini Transmissometer
7. Solid State Temp. Logger.

## Relevance/Objet

Continuing development of concepts for application of new technology to sensing, data acquisition and processing equipment is essential to ensure that the research methods and capabilities of NWRI are efficient and effective. Economy demands that the development investment be useful to a broad group of researchers.

**NATIONAL WATER RESEARCH INSTITUTE**
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**Study Plan**
**Plan d'étude**

**NO: 85-** 399

| | | |
|---|---|---|
| **STUDY TITLE/ TITRE D'ETUDE** | NWRI Open House 85 | **DIVISION** HD |
| **KEY WORDS/ MOTS CLEFS** | PUBLIC RELATIONS | **SECTION** TCSRVS<br>**PAE EAP** 1513 |
| **STUDY LEADER/ CHEF D'ETUDE** | Engel, P **TEL:** 637-4737 | **SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE** |
| **TEAM MEMBERS/ MEMBRES D'EQUIPE** | J. Valdmanis, N. DeZeeuw | |
| **TIME FRAME/ CALENDRIER** | **START DEBUT** November 1984 **FINISH FIN** May 1985 | |
| **PRIMARY USER/ USAGER PRIMAIRE** | General Public **TEL:** | **OTHER USERS/ AUTRES USAGERS** |
| **IWD/DGEI CONTACT** | **TEL:** | **INTEREST/INTERET DIRECT-GENERAL** |

Goal/But

To provide displays for Open House '85.

Performance Indicators/Indicateurs de rendement

a) Displays complete and on time for Open House: 15 April, 1985.

b) Expenditures kept below authorized ceiling of $8,000,00.

Relevance/Objet

To inform the public of work in the Institute.

09/84

**FORM A, PART 1/FORMULE A, PARTIE 1**

# AQUATIC ECOLOGY DIVISION

## Aquatic Ecology Division

The Aquatic Ecology Division is involved in research of the problems associated with environmental degradation of Canadian waters due to eutrophication, acidification, and infestation by aquatic weeds, and with management of their quality.

The Aquatic Ecology Division is organized in three multidisciplinary sections: Ecological Impact, Great Lakes Rehabilitation, and Nutrient Pathways.

### Ecological Impact Section

The major area of research of the Ecological Impact Section is related to the long-range transport of atmospheric pollutants with emphasis on the acidification of lakes. Studies emphasize sulfur isotopes as tracers of acid rain, atmospheric deposition of metals from mining, smelting, and coal-fired power plant activities and in remote areas of Canada, the use of algae in understanding the acidification of lakes, and studies of the carbon cycle in lakes and peatlands with emphasis on natural acidification processes. Other areas of research include indicators of climatic change, the application of statistical methodology to limnological problems, and the impact of peatland drainage for energy production upon receiving waters. Work of the section has covered most provinces of Canada with recent emphasis upon Nova Scotia.

### Great Lakes Rehabilitation Section

The Great Lakes Rehabilitation Section conducts research on topics related to the Canada-U.S. Agreement on Great Lakes Water Quality. These topics include the chemical and biological response to lake management, the movement of nutrients and contaminants, the distribution of bottom dwelling organisms, the storage mechanism of nutrients in sediment and the distribution of aquatic macrophytes in response to nutrient loading and their chemical and mechanical control.

### Nutrient Pathways Section

The Nutrient Pathways Section concentrates on understanding the complex interrelated processes of nutrient availability (or limitation), algal growth (and biomass), nutrient regeneration, dissolved organic substances (their presence and defining their roles in the environment), zooplankton grazing, and lake restoration methods, in addition to identifying taste and odour substances in potable water.

## STUDIES FOR AQUATIC ECOLOGY DIVISION

| SECTION | STUDY | STUDY TITLE | STUDY LEADER 85/05/31. |
|---|---|---|---|
| DIVISION | | | |
| | 401 | AQUATIC ECOLOGY DIVISION RESEARCH MANAGEMENT AND ADMINISTRATION | BARICA,J. |
| ECOLOGICAL IMPACT | | | |
| | 405 | TRACE METAL DYNAMICS IN ACID SENSITIVE LAKES OF NOVA SCOTIA | WONG,H.K.T.,NRIAGU,J.O. |
| | 406 | EFFECT OF CLIMATE ON WATER QUALITY OF CANADIAN LAKES | DELORME,L.D. |
| | 407 | STATISTICAL ANALYSES OF ENVIRONMENTAL DATA | ESTERBY,S.R. |
| | 408 | COVARIATION OF NUTRIENTS AND CONTAMINANTS | ESTERBY,S.R. |
| | 413 | SULFUR,ITS FORMS AND ISOTOPIC COMPOSITION IN ACID SENSITIVE LAKES | NRIAGU,J.O. |
| | 414 | USE OF ALGAL INDICATORS TO INTERPRET LAKE ACIDIFICATION HISTORIES | GLOOSCHENKO,W.A. |
| | 415 | LONG-RANGE TRANSPORT OF METALS BY ATMOSPHERIC PROCESSES | GLOOSCHENKO,W.A. |
| | 416 | ORIGIN OF ORGANIC WATERS AND THEIR IMPACT ON AQUATIC ECOSYSTEMS | BOURBONNIERE,R.A. |
| GREAT LAKES | | | |
| | 420 | SEDIMENT CONTAMINANTS TRANSPORT AND PHOSPHORUS REGENERATION IN L. ERIE | ROSA,F. |
| | 421 | LAKE SIMCOE REHABILITATION STUDY - OXYGEN REGIME | CHARLTON,M.N. |
| | 422 | ST. LAWRENCE AND NIAGARA RIVER CONTAMINANTS SEDIMENT TRANSPORT | CHARLTON,M.N. |
| | 423 | BIOLOGICAL ASSESSMENT OF WATER QUALITY USING INVERTEBRATE INDICATORS | KALAS,L. |
| | 424 | UPPER LAKES CONNECTING CHANNELS DATA COMPILATION | DOBSON,H.F.H. |
| | 428 | BIOAVAILABILITY OF PHOSPHORUS | MANNING,P.G. |
| | 429 | THERMOCLINE OXYGEN DYNAMICS | CHARLTON,M.N. |
| | 477 | EURASIAN WATERMILFOIL CONTROL | PAINTER,S. |
| | 478 | AQUATIC WEEDS COORDINATION AND TECHNOLOGY TRANSFER | PAINTER,S. |
| | 498 | EVALUATE CLADOPHORA TO ASSESS TRENDS IN EUTROPHICATION | PAINTER,S. |
| NUTRIENT PATHWAYS | | | |
| | 431 | TASTE, ODOUR AND TOXINS FROM BLUE-GREEN ALGAL BLOOMS | BROWNLEE,B. |
| | 432 | EFFECT OF NITROGEN LOADING ON WATER QUALITY OF WESTERN CANADIAN RIVERS | BROWNLEE,B. |
| | 433 | IMPACT OF CONTAMINANTS ON MICROBIAL ACTIVITIES | BURNISON,B.K. |
| | 436 | IMPACT OF ORGANIC COLLOIDS ON HEAVY METAL SPECIATION IN SURFACE WATERS | LEPPARD,G.G. |
| | 437 | TECHNOLOGY TRANSFER AND GUIDANCE FOR LAKE RESTORATION | MURPHY,T.P. |
| | 438 | EFFECT OF CONTAMINANTS IN NUTRIENT KINETICS | LEAN,D.R.S. |
| | 439 | EFFECT OF CALCITE PRECIPITATION UPON ALGAL PRODUCTIVITY IN L. ONTARIO | MURPHY,T.P. |
| | 490 | IMMEDIATE BIOAVAILABILITY OF PHOSPHORUS IN GRAND RIVER SEDIMENTS | ABBOTT,A. |

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                                                          DATE RUN  85/05/23.
PROCESSING FORMB FOR DIVISION AED

   ----ORGANIZATION---- --ENGINEERING---- -----MANTEC------ ---TECH OPS.--- --OM-- ------EXTERNAL---- SHADOW ----------TOTALS----------
 NO  PY SAL    OM   CAP  PY SAL   OM  CAP  PY SAL   OM  CAP  PY SAL   OM OT PY SAL AG PY SAL    OM  CAP COST     PY SAL   OM   CAP   COST

401 2.0  77  96.4   3.0  -- --   --   -- .08  3   --   --   -- --   -- -- -- --     -- --   --   --   --  2.08  80  96.4   3.0  179.2
405 1.9  73  13.5   5.0  -- --   --   --  -- --   --   -- .28  8  7.8  2 -- --LRT  -- --  5.0   --       2.18  83  26.3   5.0  114.6
406 2.0  77  16.0    --  -- --   --   -- .06  2   --   -- .10  3  3.0  1 -- --CCP1.00 31   --   --       3.16 114  19.0    --  133.2
407  .5  19  11.0    --  -- --   --   --  -- --   --   --  -- --   -- -- .07  2     -- --   --   --   --   .57  22  11.0    --   32.5
408  .5  13   6.0    --  -- --   --   --  -- --   --   --  -- --   -- -- -- --GLW  -- --  4.0   --        .45  19  10.0    --   29.2
413 1.2  46  12.7   6.0  -- --   --   -- .25  9   --   -- .20  6  1.5 -- -- --LRT  -- -- 20.0  4.0       1.60  61  34.2  10.0  105.0
414  .2   8  10.0    --  -- --   --   --  -- --   --   -- .07  2   .6 -- -- --LRT  -- --  5.0   --        .27  10  15.6    --   25.4
415  .5  13  13.9   8.0  -- --   --   --  -- --   --   --  -- --   -- -- -- --     -- --   --   --   --   .50  19  13.9   8.0   41.1
416 1.3  50   7.0   4.5  -- --   --   -- .06  2   --   -- .32 10  1.5  1 -- --LRT  -- -- 20.0   --       1.68  63  28.5   4.5   95.7
420 1.0  39   2.0    --  -- --   --   -- .18  6   --   -- .96 29  2.0  7 .04  1GLW -- -- 20.0  4.0       2.18  82  32.0   4.0  118.0
421  .3  12   3.0    --  -- --   --   --  -- --   --   --  -- --   -- -- -- --     -- --   --   --   --   .30  12   3.0    --   14.6
422  .3  12   2.0    --  -- --   --   --  -- --   --   -- .32 10   .5  4 -- --     -- --   --   --   --   .62  25   2.5    --   27.8
423 1.0  39  10.0    --  -- --   --   --  -- --   --   -- .38 11  1.5  1 -- --     -- --   --   --   --  1.38  50  11.5    --   62.0
424 1.0  39   2.5   3.5  -- --   --   --  -- --   --   -- .28  6  4.2  2 .04  1     -- --   --   --   --  1.24  47   6.7   3.5   57.6
428 2.0  77   8.5   2.7  -- --   --   -- .05  2   --   -- .17  5  3.9  1 .02  1GLW -- --  4.5  2.2       2.24  86  16.9   4.9  107.4
429 1.4  54   1.0   4.0 .50 17   --   -- .25  9   --   -- .50 15  2.0  2 .03  1GLW -- -- 25.9  1.5       2.68  98  28.9   5.5  131.9
431 1.0  39  10.0   9.5  -- --   --   -- .03  1   --   --  -- --   -- -- -- --     -- --   --   --   --  1.03  40  10.0   9.5   59.0
432 1.0  39   8.0   5.0  -- --   --   -- .04  1   --   --  -- --   -- -- -- --     -- --   --   --   --  1.04  40   8.0   5.0   52.9
433 2.0  77   6.5   2.0  -- --   --   --  -- --   --   --  -- --   -- -- -- --     -- --   --   --   --  2.00  77   6.5   2.0   85.6
436 1.7  65   5.0    --  -- --   --   --  -- --   --   --  -- --   -- -- -- --     -- --   --   --   --  1.65  65   5.0    --   70.4
437 1.2  46   6.7   1.0  -- --   --   --  -- --   --   -- .28  8   .2 -- -- --     -- --   --   --   --  1.43  55   6.9   1.0   63.4
438 2.2  85   9.5  25.0  -- --   --   --  -- --   --   -- .07  2  1.0  1 -- --     -- --   --   --   --  2.22  87  10.5  25.0  122.9
439  .2   8   3.9    --  -- --   --   --  -- --   --   -- .02  1   -- -- -- --     -- --   --   --   --   .22   8   3.9    --   12.2
477  .2   8  28.0  18.0  -- --   --   --  -- --   --   --  -- --   -- -- -- --     -- --   --   --   --   .20   8  28.0  18.0   45.7
478  .1   4   2.0    --  -- --   --   --  -- --   --   --  -- --   -- -- -- --     -- --   --   --   --   .10   4   2.0    --    5.8
498  .9  35    --    --  -- --   --   --  -- --   --   -- .05  2   .3 -- -- --GLW  -- -- 21.5  7.0        .98  36  21.0   7.0   64.9
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                                                                  DATE RUN  85/05/23.
PROCESSING FORMB FOR DIVISION AED

  ----ORGANIZATION---- --ENGINEERING---- -----MANTEC------ ---TECH OPS.--- --DM-- ------EXTERNAL---- SHADOW ----------TOTALS----------
 WO  PY SAL     OM    CAP  PY SAL   OM  CAP  PY SAL   OM  CAP  PY SAL   OM OT PY SAL AG PY SAL   OM   CAP COST    PY SAL    OM   CAP   COST

498  .7  27   1.0    --    -- --    --   --   -- --   --   --  .08  2   -- --  -- --     -- --    --    --   --    .78  29   1.0    --   30.4

   28.00   296.1         .50     --       1.00     --        4.00   30.0   .20     1.00  133.9          --        1320        108.7
      1090         90.0       17      --        34        --       121     20.     7         31    18.7      34.70      460.0        1888.3
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|---|---|---|
| **NATIONAL WATER RESEARCH INSTITUTE**<br>**L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX** | **Study Plan**<br>**Plan d'étude** | **NO: 85-** 401 |

| | | |
|---|---|---|
| **STUDY TITLE/ TITRE D'ETUDE** | Aquatic Ecology Division Research Management and Administration | **DIVISION** AED |
| **KEY WORDS/ MOTS CLEFS** | MANAGEMENT, ADMINISTRATION | **SECTION** AEDDIV<br>**PAE EAP** 1514 |
| **STUDY LEADER/ CHEF D'ETUDE** | Barica, J. **TEL:** 637-4227 | **SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE** |
| **TEAM MEMBERS/ MEMBRES D'EQUIPE** | J. Major, F. Boyd | |
| **TIME FRAME/ CALENDRIER** | **START DEBUT** **FINISH FIN** Ongoing | |
| **PRIMARY USER/ USAGER PRIMAIRE** | **TEL:** | **OTHER USERS/ AUTRES USAGERS** |
| **IWD/DGEI CONTACT** | **TEL:** | **INTEREST/INTERET DIRECT-GENERAL** |

## Goal/But

To plan, organize, manage and control the scientific and administrative program of the Aquatic Ecology Division in an effective and efficient manner.

## Performance Indicators/Indicateurs de rendement

1. Direct study plan preparation in view of departmental priorities and client's needs and control study progress quarterly.
2. Provide liaison and research coordination with the clients and other federal, provincial, and private agencies, and universities.
3. Prepare scientific and management reviews, issue analyses and policy documents for publication or presentation, as required.
4. Initiate preparation of a summary publication on eutrophication of lakes in Western Canada (Prairie lakes monograph). Solicit contributors.
5. Prepare staff appraisal and promotion documents, ensure research grant reviews.
6. Convene regular section meetings, other impromptu meetings as required for program development, and ensure regular reviews of projects with project leaders and outside reviewers.
7. Ensure regular monitoring of study progress and study evaluation (internal and external).
8. Provide secretarial services, administrative services, staff training, conference and program travel, photocopier and word processing services.

## Relevance/Objet

To provide high scientific standard, applicability and utility of research projects; to ensure high degree of efficiency, effectiveness and economy in the Division's projects and administration of A-Base and external funding under GLWQA, LRTAP, PERD and CCP.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 405

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Trace Metal Dynamics in Acid Sensitive Lakes of Nova Scotia | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | HEAVY METALS, ALUMINUM, ACID PRECIPITATION, PARTICULATE METALS, Pb-210, GEOCHRONOLOGY, SEDIMENT GEOCHEMISTRY, NOVA SCOTIA | SECTION EMPACS<br>PAE EAP 4200 |
| STUDY LEADER/ CHEF D'ETUDE | Wong, H.K.T., Nriagu, J.O. TEL: 637-4382 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | R.D. Coker, J.J. Kerekes, (CWS-Atlantic) | |
| TIME FRAME/ CALENDRIER | START DEBUT Apr. 1984 FINISH FIN March 1986 | LRTAP |
| PRIMARY USER/ USAGER PRIMAIRE | F.C. Elder, LRTAP TEL: 637-4212 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | T.A. Clair<br>M. Papineau, Quebec TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To estimate the flux of heavy metals (Pb, Zn, Cu, Ni, Cd) including sulfur and aluminium, into lake water and sediment; to assess the role of suspended particulate matter in the chemistry of pollutant metals in softwater lakes; to assess the changes in the rate of atmospheric loading of trace metals and other pollutants by relating the historical record of source emissions to records in recent sediments; to evaluate the short and long term effects of acid precipitation on the pollutant metals, specially Al, in the sediments of these softwater lakes.

## Performance Indicators/Indicateurs de rendement

1. Complete metal analysis and isotope tracer measurements of particulates and sediments, sediment core dating, data analysis and estimation of geochemical budgets from field samples recovered in 1984 (by March 1986).
2. Field sampling (sediment traps) of three lakes in Kejimkujik National Park Area, N.S. (by October 1985).
3. Compilation of 1982-84 LRTAP study results of Ontario softwater lakes for publication, (by Jan. 1986); report/manuscript on 1984/85 porewater chemistry (by June 1986).

## Relevance/Objet

A major contribution of pollutant metal and acid input in the remote (rural) lakes of Nova Scotia comes from atmospheric deposition. The mechanism of trace metal transfer (flux) within the water column is a vital link in the study of metal cycles in relation to lake acidification. Consequently, seasonal trap material within the water column are being monitored as a means of understanding the evolution and flux of the particulate metal pool.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

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|---|---|
| STUDY TITLE/<br>TITRE D'ETUDE | Effect of Climate on Water Quality of Canadian Lakes |
| KEY WORDS/<br>MOTS CLEFS | PALEOCLIMATE, PALEOLIMNOLOGY, WATER QUALITY, CLIMATIC CHANGE, PROXY DATA, PRAIRIES, DROUGHT, INVERTEBRATES |
| STUDY LEADER/<br>CHEF D'ETUDE | Delorme, L.D. TEL: 637-4317 |
| TEAM MEMBERS/<br>MEMBRES D'EQUIPE | N.S. Harper, Term, TOD |
| TIME FRAME/<br>CALENDRIER | START<br>DEBUT April 1984 FINISH<br>FIN March 1987 |
| PRIMARY USER/<br>USAGER PRIMAIRE | Canadian Climate Program TEL: |
| IWD/DGEI<br>CONTACT | M. Quast TEL: |

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| NO: 85- | 406 |
| DIVISION | AED |
| SECTION | EMPACS |
| PAE<br>EAP | 1532 |
| SUPPLEMENTAL RESOURCES/<br>FINANCEMENT SUPPLEMENTAIRE | CCP |
| OTHER USERS/<br>AUTRES USAGERS | |
| INTEREST/INTERET<br>DIRECT-GENERAL | |

Goal/But

To evaluate the relationship between climate and water quality and certain organisms using proxy data, namely:

1. To characterize fossil benthic shelled invertebrates found in shallow lakes;
2. To interpret chemical, physical, and climatic variables of these shallow lakes by means of fossil benthic shelled invertebrates;
3. To further understand the use of shelled invertebrates as paleolimnological and paleoclimatic indicators.

Performance Indicators/Indicateurs de rendement

1. To collect one core from 2 to 5 lakes from Great Lakes and Prairie Region.
2. To enumerate fossil pollen and shelled invertebrates (Feb. 1986).
3. Internal sedimentologoical report (Jan. 1986).
4. Progress report by March 31, 1986.

Relevance/Objet

To advance knowledge of the role climate has on water quality through the use of proxy climatic, chemical, and biological data.

The absence of long term (greater than 100 years) climate and limnological records leaves a gap in the knowledge of Canadian lakes and ponds. The use of proxy data fills this void. Such information is particularily important when preparing climate scenarios which provide evidence for changes in the ecosystem. Changes in water levels, water quality and quantity are all controlled by climate. For example, producing data for drought scenarios is crucial in agrigulture and water planning and management. The results of the study will be used by the Canadian Climate Programme.

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Study Plan
Plan d'étude

NO: 85- 407

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Statistical Analyses of Environmental Data | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | STATISTICAL MODELLING, ECOSYSTEM, WATER QUALITY, CALIBRATION, LRTAP, CLIMATE, CONTAMINANTS | SECTION EMPACS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Esterby, S.R. TEL: 637-4362 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | - | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1984 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | A. Demayo TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | S. Whitlow, R. Stevens<br>H. Sloterdijk, Quebec TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To extract more information from the available environmental data sets by the use of statistical methods. The types of data considered are lake and river water quality data, aquatic community data, sediment core data and paleoecological calibration data, with emphasis on toxic contaminants and LRTAP. Evaluate the within-laboratory and sampling components of variability in Great Lakes surveillance data.

Performance Indicators/Indicateurs de rendement

1. Preparation of WQB data analysis and presentation manual. First draft by July 1, 1985, completion by December 1985.
2. Paper on statistical aspects of assessing effects of persistent toxic substances on biota for IJC sponsored workshop by June 1985.
3. Report on comparison of cores (i.e. diatom and pollen levels) and statistical analyses (84/85) completed by March 1986.
4. Report on results from 84-85 study by March 1986 (in collaboration with R. Stevens).

Relevance/Objet

1. Meet WQB priority of increasing the analysis of water quality monitoring data.
2. Meets IJC, Science Advisory Board's recommendation for more work on the effect of contaminants on the health of aquatic communities of the Great Lakes,
3. Results are relevant to inferences about past pH of acid susceptible lakes (LRTAP). Methodological results are important to calibration in LRTAP and climate program, and to spatial distribution of contaminants.
4. Results are important to design of sampling programs and analysis of existing data for the Great Lakes Surveillance.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85-408

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Covariation of Nutrients and Contaminants | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | STATISTICAL MODELLING, WATER QUALITY, CONTAMINANTS, NIAGARA RIVER | SECTION EMPACS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Esterby, S.R. TEL: 637-4362 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | GLWQA |
| PRIMARY USER/ USAGER PRIMAIRE | Dr. D.J. Hallett, Chairman<br>Great Lakes Toxic Chemical Committee<br>TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | K. Kuntz<br>H. Sloterdijk, Quebec<br>TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

Determine statistical models suitable for describing the covariation of substances of low concentration with substances readily measured. Analyse nutrient and contaminant concentrations in water and sediment of the Niagara River.

## Performance Indicators/Indicateurs de rendement

1. Review statistical methods for the combination of discrete and continuous variables by May 1985.
2. Analyse nutrient and contaminant data for the Niagara River (IWD data, K. Kuntz) to characterize distributions in both water and sediment. Complete by February 1986.
3. Report on the results of 1 and 2 by March 1986.

## Relevance/Objet

This study is relevant to the role of sediment in nutrient and contaminant transport and to the identification of readily measurable substances which indicate the presence of (other) contaminants. Special statistical techniques are required to combine these two types of data since the former is often less quantitative. This study will show how this can be done and also permit questions such as the existence of trend to be answered. It is related to Niagara River project, APSD 505.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85-413

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Sulfur, Its Forms and Isotopic Composition in Acid Sensitive Lakes | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | SULFUR ISOTOPES, ORGANOSULFUR COMPOUNDS, TURKEY LAKES, KEJIMKUJIK NATIONAL PARK, NOVA SCOTIA | SECTION EMPACS<br>PAE EAP 4200 |
| STUDY LEADER/ CHEF D'ETUDE | Nriagu, J.O. TEL: 637-4223 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | R. Marine (PDF), R.D. Coker, H.K. Wong | |
| TIME FRAME/ CALENDRIER | START DEBUT 1985 FINISH FIN | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | F.C. Elder<br>M. Papineau, Quebec TEL: 637-4212 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. Complete the isotopic and mass balance for sulfur in a calibrated watershed by monitoring the flux of sulfur into and out of the various components of the Turkey Lakes basin.
2. Measure the concentrations of volatile organosulfur compounds in some selected lakes and evaluate their role in the flux of sulfur from these lakes to the atmosphere.

## Performance Indicators/Indicateurs de rendement

1. Complete measurement of the isotopic composition of sulfur in samples of rainwater, lake and stream waters, groundwaters, soil percolates, spring runoff, stem flow, etc. collected between 1982 and 1984 by January 1986.
2. Derive a provisional isotopic balance for sulfur in the Turkey Lakes watershed and compare that against the mass balance for this element by March 1986.
3. Review the available literature on the distribution of volatile organosulfur compounds in lakes by September 1985.
4. Field work, collect samples for determination of organosulfur compounds by October 1985.
5. Laboratory studies of samples from item (4) by March 1986.
6. Report on distrubiton and role of organosulfur compounds in Canadian Lakes by September 1986.

NOTE: Start and completion of items 3-5 depends on availability of funding for a postdoctoral fellow.

## Relevance/Objet

The study should provide the much needed data on the extent of S flux from lakes (and associated marshes) to the atmosphere. The sulfur isotopic results will be used to fingerprint the sources, behaviour and sinks for sulfur in the calibrated watershed. Thus, the study will fill important gaps in the ECS Acid Rain Program.

Results will be submitted to the Chairman, Aquatic Impact Committee of LRTAP Program under CCREM.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85 414

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Use of Algal Indicators to Interpret Lake Acidification Histories | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | ACIDITY, ALGAE, ECOLOGY, ECOSYSTEM, PHYTOPLANKTON, ACID LAKES, WETLANDS | SECTION EMPACS<br>PAE EAP 4200 |
| STUDY LEADER/ CHEF D'ETUDE | Glooschenko, W.A. TEL: 637-4229 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT 1 April 1985 FINISH FIN 31 March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | D. Haffner, WQB-HQ TEL: 997-3422 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | F. Elder TEL: 637-4212 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To review literature on algal indicators of lake acidification and algal composition and ecology of acidic wetlands.
2. To determine the value of diatoms as paleoindicators of lake acidification.
3. To determine nature of export of algae from acidic wetlands into lakes and streams.

## Performance Indicators/Indicateurs de rendement

1. Literature review of new papers and reports to be completed by February 1986.
2. Field sampling of algae from selected acidic lakes in northern Ontario by November 1985. Collect sediment and water samples for chemical analysis.
3. Review and assess scientific validity of diatom research related to lake acidification as requested by chairman, Aquatic Impact Committee, LRTAP.
4. Report on algal indicators by March 1986.

## Relevance/Objet

To further understand the acidification history of lakes, use has been made of diatom distribution in sediment cores. This study will determine the value of such biotic indicators of lake acidification.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85-415

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Long-Range Transport of Metals by Atmospheric Processes | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | ATMOSPHERIC DEPOSITION, BIOGEOCHEMISTRY, COAL, CONTAMINANTS TRANSPORT, LRTAP, METALS, ACID RAIN | SECTION EMPACS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Glooschenko, W.A. TEL: 637-4229 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J. Nriagu, W. Strachan (ECD) | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1983 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | D. Haffner, WQB-HQ TEL: 997-3422 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | CCREM TEL: 637-4212 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To conduct a baseline study of trace metals, As, Se and S in *Sphagnum* mosses, lichens, peat, and plant litter in areas of intensive mining activity and near coal-fired plants.
2. To determine scientifically-valid, cost-effective biotic monitors of atmospheric metal deposition and organochlorine contaminants.
3. To determine baseline concentrations of metals in mosses and lichens in areas remote from point sources.

## Performance Indicators/Indicateurs de rendement

1. Complete analysis of samples by November 1985.
2. Collect samples from northern Ontario and Quebec, and Prairie Provinces by October 1985.
3. Present paper on results of Canada transect at Muskoka Conference by September 1985 subject to acceptance by conference organizers.
4. Conclude and prepare two final reports on research by March 1986.

## Relevance/Objet

Coal-fired power plants and mining activities are major sources of atmospheric emissions of metals, S, As, and Se to adjacent aquatic ecosystems. This study will develop biotic monitors of atmospheric deposition to supplement direct precipitation sampling in remote areas.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 416

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Origin of Organic Waters and Their Impact on Aquatic Ecosystems | DIVISION | AED |
| KEY WORDS/ MOTS CLEFS | AQUATIC ENVIRONMENTS, NOVA SCOTIA, ACIDITY, LRTAP, TOXIC METALS, ORGANIC ACIDS, CONTAMINANTS | SECTION | EMPACS |
| | | PAE<br>EAP | 4200 |
| STUDY LEADER/ CHEF D'ETUDE | Bourbonniere, R.A. TEL: 637-4547 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE | LRTAP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | W.A. Glooschenko | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1984 FINISH FIN March 1988 | | |
| PRIMARY USER/ USAGER PRIMAIRE | F.C. Elder, LRTAP TEL: | OTHER USERS/ AUTRES USAGERS | |
| IWD/DGEI CONTACT | T. Clair, WQB, Moncton TEL: (506)-388-6606 | INTEREST/INTERET DIRECT-GENERAL | |

Goal/But

Characterize the chemical composition, both organic and inorganic, of lake and river waters from LRTAP sites in Nova Scotia to show how natural organic acidity contributes to the total acidity.
Specific components of interest are hydrophobic and hydrophilic organic acids, toxic metals such as aluminium, lead, and mercury and other components which interact with toxic constituents.

Performance Indicators/Indicateurs de rendement

1. Sample, characterize and quantify the extent to which organic matter from the Clyde River at Barrington, N.S. enters the sediments and benthic organisms of Lyles Bay and Negro Hbr. which are adjacent and downstream. Field and laboratory work to be done in collaboration with McMaster University which is funded separately (DFO) for their part in this work. Report on our part by February 1986.
2. Sample and characterize waters from selected N.S. rivers and lakes on a monthly basis throughtout FY 85/86 (LRTAP).
3. Carry on with detailed study of organic sources to Beaverskin and Pebblelogitch Lakes in Kejimkujik National Park (in collaboration with CWS, Halifax). Report by March 1986 (LRTAP). Results will be submitted to the Chairman of the Aquatic Impact Committee of the LRTAP Program under the CCREM.
4. Completion of final report for study 419 (1983/84) by January 1986.

Relevance/Objet

Natural organic acidity has been recognized as a significant contributor to the total acidity of Nova Scotia rivers. As such, it affects our understanding to the degree to which airborne pollutants impact those waters.
Organic matter, by its interaction, influences the toxicity of metals such as aluminium. Thus, we have a tie to the potential impact on aquatic biota.

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Study Plan
Plan d'étude

NO: 85- 420

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Sediment Contaminants Transport and Phosphorus Regeneration in L. Erie | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | LAKE ERIE, SEDIMENTS, CONTAMINANTS, PCB's, IRON, PESTICIDES, HERBICIDES, PHOSPHORUS | SECTION GRLRHS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Rosa, F. TEL: 637-4547 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | P.G. Manning<br>J. Carey | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1983 FINISH FIN September 1986 | GLWQP |
| PRIMARY USER/ USAGER PRIMAIRE | IJC TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | D. William, IWD-OR TEL: 359-5321 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Measure sediments and associated contaminants (Pest., Herb.) diffusing out from the Sandusky Bay into Lake Erie.
2. Measure regeneration of metals and nutrients in the Central Basin of Lake Erie.
3. Determine the iron-phosphorus relationships of sediment available phosphorus.
4. Measure metal and nutrient gradients in pore water to allow eventual estimate of internal diffusive loading.

Performance Indicators/Indicateurs de rendement

1. Report on the spatial variability of suspended particulates and associated contaminants (pesticides and herbicides) in the Sandusky Bay area by September 1986.
2. Sample sediments and water chemistry during 4 cruises on the Central Basin of Lake Erie. Install and recover apparatus (peepers) 2 times - June to October.
3. Complete bioavailable P and Iron-P analysis by Sept. 1986 (Lake Erie).
4. Contract for diffusion coefficient measurements, install and recover peeper apparatus 2 times and report on the spatial variations by Sept. 1986 (Lake Erie).

Relevance/Objet

1. Diffusive loadings of contaminants and nutrients from Sandusky Bay into Lake Erie is an important issue, (GLWQA, Annex 3, 1983) since Sandusky Bay receives a large input from agricultural runoff. Part of an integrated study with the Ohio State University.
2. Internal loading (sediment to water) of contaminants and nutrients is an important process in lakes. To assess the efficiency of present external loading reductions and the importance of future reductions, continued research on the internal loading and the bioavailability of sediment P (GLWQA, Annex 3, 1983) is required, with emphasis on spatial variability.

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Study Plan
Plan d'étude

NO: 85-421

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|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Lake Simcoe Rehabilitation Study - Oxygen Regime | | DIVISION AED |
| | | | SECTION GRLRHS |
| KEY WORDS/ MOTS CLEFS | EUTROPHICATION, LAKE SIMCOE, OXYGEN-DISSOLVED, PH, CONDUCTIVITY, SUSPENDED SOLIDS | | PAE<br>EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Charlton, M.N. | TEL: 637-4220 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | W. Booth, K.H. Nicolls (OME) | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | | |
| PRIMARY USER/ USAGER PRIMAIRE | K.H. Nicholls, OME | TEL: 248-3050 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | DG-OR | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

In collaboration with Ontario MOE, to investigate and demonstrate the applicability of the NWRI Profiling System to the dissolved oxygen problem in Lake Simcoe caused by changing nutrient loads and the appearance of a new species of benthic algae (Dichotomosiphon).

Performance Indicators/Indicateurs de rendement

1. Produce a pH, conductivity, turbidity, $O_2$, temperature/Dept's sonde for use on Lake Simcoe by July 1985.
2. Demonstrate apparatus on 2 surveys of Lake Simcoe designed to indicate the effect of Dichotomosiphon on the oxygen regime.
3. Report on cooperative findings by March 1986.

Relevance/Objet

The new benthic alga Dichotomosiphon has appeared in the Great Lakes and is well established in Lake Simcoe with potentially harmful effects on oxygen and nutrients which are being controlled by sewage diversion. Cooperation with Province of Ontario will provide useful information on L. Simcoe with possible use in the Great Lakes. This study is designed at the request of OME.

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Study Plan
Plan d'étude

NO: 85- 423

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Biological Assessment of Water Quality Using Invertebrate Indicators | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | BIOTA, CONTAMINANTS, ECOLOGY, ECOSYSTEM, IMPACT, INVERTEBRATES, RIVERS, UPPER GREAT LAKES, WORKSHOP | SECTION GRLRHS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Kalas, L. TEL: 637-4506 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J. Metcalfe, R. Dermott, A. Mudroch, B. Oliver | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | WQB TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | D. Haffner, WQB - HQ<br>W. Traversy, H. Sloterdijk, Quebec TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To select a biosurveillance approach using macroinvertebrates for the assessment of the quality of fresh waters across Canada.
2. To assemble (with the help of IWD region technical personnel) adequate material and data to compile a manual for assessing the biological quality of the Canadian surface waters with an atlas of indicator species (work on the manual will continue to 1986-87).
3. To gather information about how to construct maps of the biological quality of surface waters based on biotic indices.
4. To present a practical scheme on how benthic macroinvertebrates sampling could be incorporated into existing federal and provincial water quality monitoring programs.

## Performance Indicators/Indicateurs de rendement

1. Participate at the biomonitoring workshop organized by the Water Quality Branch and co-sponsored by the International Joint Commission (1985).
2. Perform tests with field sampling and lab equipment to be routinely used in biological water quality monitoring (May-June 1985).
3. Design (with R.E. Kwiatkowski, WQB and in co-operation with regional IWD personnel) a network of 12 stations appropriate for the biological monitoring and initiate the investigation (July 1985).
4. Collect benthic material for the WQB study of the Exploit River watershed, Newfoundland (August 1985). Collect benthic material for the Upper Great Lakes Connecting Channels study of the St. Clair and Niagara Rivers subject to GLWQP funding.
5. Submit a report on suitability of biotic indices developed and used by the European and Consumer Protection Services and their calibration with (i) reliable Canadian standards and (ii) degrees of contamination estimated or measured by chemical and related criteria.

## Relevance/Objet

The proposed research advances assessment of the Canadian surface water quality using biological indicators. It deals with high priority human and ecosystem health control (in an area of the fresh water management responsibility) in an innovative, practical, straightforward way and at low costs.

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Study Plan
Plan d'étude

NO: 85- 424

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Upper Lakes Connecting Channels Data Compilation | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | UPPER GREAT LAKES, DATA HISTORICAL, CHANNELS, DETROIT RIVER, LAKE HURON, LAKE SUPERIOR, LAKE ERIE | SECTION GRLRHS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Dobson, H.F.H. TEL: 637-4506 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | P.G. Manning, J. Simons, M. Charlton<br>B. Oliver, F. Boyce | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | RDG-OR TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | T. Wagner, IWD - RD TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To collect, compile, and summarize ULCC information gathered in the last 20 years for the eventual presentation of trends in water quality parameters.

## Performance Indicators/Indicateurs de rendement

1. Collect available information on Lower L. Superior, St. Mary's River, Lower L. Huron, St. Clair River, L. St. Clair, Detroit River, and Western Lake Erie by July 1985.
2. Produce report catalogue by March 1986.
3. Produce graphs and tables of appropriate trend analyses by March 1986.
4. Produce manuscript on nutrient limitation by March 1986.
5. Analyze and present data gathered in 1985 for presentation by March 1986.

## Relevance/Objet

In response to DOE priority on determining the pollution status of Upper Great Lakes Connecting Channels.

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Study Plan
Plan d'étude

NO: 85- 428

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Bioavailability of Phosphorus | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | BIOAVAILABILITY, PHOSPHORUS, SEDIMENTS, GREAT LAKES, PRAIRIES, UPPER LAKES CONNECTING CHANNEL | SECTION GRLRHS<br>PAE EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Manning, P.G. TEL: 637-4232 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>GLWQP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | F. Rosa, T. Mayer, S. Painter, A. Abbott, T. Murphy | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | IWD, W&N Region TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | D. Davis, IWD-RD TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To determine the binding capacities of sediments and of suspended sediments for phosphorus and the relationship between these capacities and phosphorus bioavailability, with particular reference to the eutrophic lakes of Western Canada and the Upper Great Lakes Connecting Channels Project.

## Performance Indicators/Indicateurs de rendement

1. Retrieve sediment cores and suspended sediments from Qu'Appelle Valley lakes, July - October 1985. Phosphorus and Mossbauer studies December - March 1986. Report on binding capacity of sediments for P by December 1986.
2. Retrieve sediment cores and suspended sediments in the Grand River - Eastern Basin - Lake Erie, Summer '85. Phosphorus bioavailability and Mossbauer studies by Oct. 1985, (Related to AED 420, AED 490 and AED 498).
3. Retrieve three sediment cores from Central Basin of Lake Erie for bioavailable P and Fe analyses. For collation with study AED 420 (F. Rosa). June - Oct. 1985.
4. Retrieve 3 sediment cores and suspended sediments from Lake St. Clair, Summer/Fall 1985 (Contribution to NWRI Upper Great Lakes Connecting Channel Study). NAIP and Fe analyses by Jan. 1986.
5. Retrieve sediment core from Kootenay Lake, B.C., Summer '85, Mossbauer, NAIP, silver, Cd, Pb analyses by January 1986. Feasibility study on nutrient-toxic interaction by Dec. '86.
6. Retrieve sediment cores from Frisken and Chain Lakes, B.C., Summer '85. Report on suitability of Mossbauer data to lake restoration by March 1986 (related to AED 437).

## Relevance/Objet

Quantification of iron-phosphorus interactions is major step in determining bioavailability of phosphorus. Nutrient-toxic interactions to be initiated in Kootenay Lake, to assess effects of Pb, Ag and Cd on P bioavailability in mud. Iron-phosphorus forms are particularly important in the eutrophic Prairie Lakes. Extension of work to UGLCC studies will describe the influence of anthropogenic iron loading in the Detroit River.

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Study Plan
Plan d'étude

NO: 85-429

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Thermocline Oxygen Dynamics | DIVISION<br>AED |
| KEY WORDS/ MOTS CLEFS | PROFILING SYSTEM, OXYGEN-DISSOLVED, WATER QUALITY, MODELS, ALGAE, NUTRIENTS, PH, POLLUTION, EUTROPHICATION, SUSPENDED SOLIDS, CALIBRATION, ... | SECTION<br>GRLRHS<br>PAE EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Charlton, M.N. TEL: 637-4220 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J.S. Ford, M. Munawar, S.S. Rao, W.G. Booth | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | GLWQP |
| PRIMARY USER/ USAGER PRIMAIRE | IWD-OR TEL: 637-4531 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | D. Williams, IWD-OR TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

Complete development of prototype $O_2$ profiler by adding pH, conductivity and turbidity sensors. Provide back-up system for use on Hamilton Harbour. Deploy main system on six surveys of Lake Erie to provide corraborating Water Quality Data and map the extent of thermocline oxygen depressing in the East Basin and development of anoxia in the Central Basin. Develop field calibration protocol.

## Performance Indicators/Indicateurs de rendement

1. Complete construction of enhanced prototype and backup system by July 1985.
2. Deploy system and collect nutrient and microbiology data on 6 surveys of Lake Erie, June - Sept.
3. Map the extent and determine biological characteristics of thermocline oxygen depressions by March 1986.
4. Provide analysis paper on profiling experience and applicability to surveillance by March 1986.
5. Produce report on Lake Erie water quality 1984-85 by March 1986.

## Relevance/Objet

Address need to streamline data collection and applied to IJC recommendation to monitor chemical and biological response of lakes to nutrient loading abatement as specified in GLWQA of 1978. Hamilton Harbour data requested by V. Cairns, DFO, Lake Simcoe data requested by OME.

The technical phase of this project provides equipment, testing, and documentation for routine users consistent with data systems initiatives of TOD. The system will be turned over to TOD in 86-87. Development will be completed with Engineering estimated for 85-86 although, of course, full success cannot be guaranteed. Technical development and demonstration in 1983-84 was successful.

The demonstration/survey phase provides proof and documentation of profiles performance. In 85-86 there is no U.S. EPA contract for Erie surveillance so this will be the only effort - survey design resembles recommendations of L. Erie Task Force. Users will be IWD-OR, US-EPA, IJC.

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Study Plan
Plan d'étude

NO: 85-431

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Taste, Odour and Toxins From Blue-Green Algal Blooms | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | TASTE, ODOUR, TOXINS, BLUE-GREEN ALGAE, EUTROPHICATION | SECTION NUPROS<br>PAE EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Brownlee, B. TEL: 637-4221 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | G.A. MacInnis, D.S. Painter | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1988 | |
| PRIMARY USER/ USAGER PRIMAIRE | WQB - W&NR TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | W.D. Gummer TEL: 359-5322 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To determine the effectiveness of granular activated carbon treatment for geosmin removal in a water supply from a lake having blue-green algal blooms.
2. To determine the causes of taste and odour in water supplies for some smaller municipalities and to examine some possible treatment methods.
3. To determine what research is required into toxin production by blue-green algal blooms.

## Performance Indicators/Indicateurs de rendement

1. (a) Geosmin analysis of samples collected from the Regina distribution system by November 1985.
   (b) Analysis of raw and finished water from the Buffalo Pound water treatment plant to determine if geosmin is released during the treatment process by November 1985.
   (c) Final report by March 1986.
2. (a) Choose two or three study sites in consultation with WQB (W&NR), PFRA, Saskatchewan Environment and Manitoba Environment.
   (b) Develop sampling method (cartridge sampler) by July 1985.
   (c) Sample each site and do qualitative analysis by July-October 1985.
   (d) Begin bench scale work on possible treatment methods.
   (e) Progress report by March 1986.

3. (a) Literature review by December 1985.
   (b) Research plan and progress report by March 1986.

## Relevance/Objet

Taste and odour in water supplies is a serious problem for many western Canadian municipalities. The most common cause appears to be blue-green algal blooms brought on by eutrophication. Gorham has shown that some blue-green algae can produce toxins, but very little is known about this in Canadian waters.

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Study Plan
Plan d'étude

NO: 85-432

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Effect of Nitrogen Loading on Water Quality of Western Canadian Rivers | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | RIVERS, NUTRIENTS, EUTROPHICATION, NITROGEN CYCLE, WATER QUALITY, DATA LOGGER | SECTION NUPROS<br>PAE EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Brownlee, B. TEL: 637-4221 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | G.A. MacInnis | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1988 | |
| PRIMARY USER/ USAGER PRIMAIRE | WQB - W&NR TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | W.D. Gummer TEL: 359-5322 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To predict the effect of increased nitrogen loading (as nitrate) on downstream water quality for selected western rivers.
2. To examine the role of nutrient loading from rivers in the eutrophication of reservoirs in western Canada.

## Performance Indicators/Indicateurs de rendement

1. (a) Completion of data analysis and writeup of nutrient studies on Canagagigue Creek by March 1986.
   (b) Manuscript(s) from Canagagigue work by March 1986.
   (c) Extension and application of these results to a western Canadian river.
   (d) Assessment of existing data bases for the Souris and Red rivers and preliminary data analysis, October 1985 - March 1986.
   (e) Subject to MANTEC allocation, evaluation of a portable microcomputer for use as low-cost, battery-operated data logger. Progress report by March 1986.
2. Ongoing discussion with WQB, W&NR on nutrient problems in some river-reservoir systems.

## Relevance/Objet

Eutrophication of lakes and rivers and interboundary transport of pollutants is a serious problem in western Canada. If the Garrison Diversion Unit is constructed in N. Dakota, nitrate concentrations in the Souris River (an international water) are forecast to double or triple. Existing data bases should be used (and expanded on if necessary) to predict the effect on downstream water quality in Manitoba.

The recent drought in souther Saskatchewan has shown the importance of Lake Diefenbaker as the region's largest source of good quality freshwater. There is concern that water quality in the lake will deteriorate due to nutrient input from the Southern Saskatchewan River. Saskatchewan DOE and IWD-Water Quality Branch (W&NR) have completed a survey to examine this issue. This study is designed to assist them with interpretation of nutrient processes, if requested.

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Study Plan
Plan d'étude

NO: 85-433

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Impact of Contaminants on Microbial Activities | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | BACTERIA, MICROBIOLOGY, PHYSIOLOGY, WATER QUALITY, HEAVY METALS, NORTH, PCB's, HERBICIDES | SECTION NUPROS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Burnison, B.K. TEL: 637-4706 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | D.J. Nuttley | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | D. Haffner, WQB-HQ TEL: 997-3422 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | R. Stevens, WQB-OR TEL: 637-4641<br>D. Haffner, W. Traversy, WQB-HQ 997-3422 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. Techniques which were designed for determining bacterial metabolic activities will be used as "bioindicators" of local contaminant areas in Lake Ontario and the Canadian Arctic (Barrow Strait).
2. To test the applicability of using the tritiated thymidine method for estimating bacterial secondary productivity in aquatic ecosystems.
3. Organizing a meeting titled "International Symposium on Aquatic Microbial Ecology" at NWRI, May 13-15, 1985.

## Performance Indicators/Indicateurs de rendement

1. Experiments dealing with the impact of copper, aluminium, mercury, PCB and atrazine will be completed by March 1986.
2. Present a review of bacterial productivity methods to a Biomonitor Workshop planned to be held in the spring, 1985.
3. Abstracts for the symposium will be printed and the meeting will be held at NWRI, May 13-15, 1985.

## Relevance/Objet

The Water Quality Branch of IWD is interested in biological methods which can be used in their Biomonitoring Program. Bacterial metabolic activity measurements have potential for this program. These metabolic activities and productivity measurements are sensitive indicators of changes which occur when the cells are put under environmental stress (exposure to contaminants). Bacterial productivity can be used as an indicator of biological activity in base-line studies on Arctic research. The activities of the bacterial community must be known before the environmental impact of potential oil spills can be fully evaluated.

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Study Plan
Plan d'étude

NO: 85- 436

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Impact of Organic Colloids on Heavy Metal Speciation in Surface Waters | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | ALUMINUM, IMPACT, IRON, ORGANICS, BACTERIA, TECHNOLOGY TRANSFER, ALGAE, FIBRILS, SURFACE FILMS, HUMIC SUBSTANCES, HEAVY METALS | SECTION NUPROS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Leppard, G.G. TEL: 637-4232 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | D. Urciuoli, T. Murphy, J. Nriagu, D. Lean, S. Rao (AMD), J. Buffle (Univ. of Geneva) | |
| TIME FRAME/ CALENDRIER | START DEBUT March 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | R. McCrea, IWD-OR TEL: 637-4643 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Identification of natural colloids having a high affinity for iron and aluminum.
2. Description of aggregation states of aquatic fulvic acids and how aggregation phenomena affect heavy metal speciation.
3. Correlations relating acid stress to the structure and activity of lake bacteria.
4. Assessing the capacity of an analytical EM to provide data in support of the related studies of Mr. Murphy and of Dr. Rao.
5. Assisting Dr. Rao and Dr. Nriagu with bacterial activity experiments involving heavy metal detoxification.

Performance Indicators/Indicateurs de rendement

1. Report to IWD-OR on organic colloid associations with Fe and Al by April 1985.
2. Manuscript (with Prof. Buffle) on aggregation phenomena in colloidal fulvic acid by April 1985.
3. Completion of field-oriented research with Dr. Rao and Dr. Nriagu relating acid stress to bacterial activity by October 1985.
4. Assessment of analytical EM capacity to provide metal-microbe binding information to Mr. Murphy and Dr. Rao by November 1985.
5. Report on acid stress effects on heavy metal detoxification by lake bacteria by March 1986.

NOTE
The realization of these indicators is contingent upon the analytical needs of most collaborators being met by DOE services.

Relevance/Objet
This study is directly relevant to DOE National Programs in Environmental Contaminants, Aquatic Ecology and Eutrophication. Portions of it are being incorporated into LRTAP projects and studies supported by IWD-OR. International collaborators include Prof. Buffle in Switzerland. The study assumes that colloid phenomena can significantly modulate water quality by mechanisms not yet delineated, and that knowledge of these mechanisms could be put to direct practical use.

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Study Plan
Plan d'étude

NO: 85-437

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Technology Transfer and Guidance for Lake Restoration | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | ALGAE, EUTROPHICATION, NUTRIENTS, PHOSPHORUS, REHABILITATION, RESERVOIRS, TECHNOLOGY TRANSFER, WATER QUALITY, BRITISH COLUMBIA | SECTION NUPROS<br>PAE EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Murphy, T.P. TEL: 637-4602 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | D. Urciuoli, P. Manning, | LIME<br>WQ |
| TIME FRAME/ CALENDRIER | START DEBUT FINISH FIN | |
| PRIMARY USER/ USAGER PRIMAIRE | K. Ashley, B.C. Environment TEL: 228-1158 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

Improve in-situ lake restoration by:

1. Developing better guidelines to distinguish which lakes are appropriate for lime addition or lake aeration. We hope to resolve if pyrite formation removes much of the reactive iron from hypertrophic hardwater lakes. Mossbauer spectrometry could quantify pyrite and EDAX-EM studies establish a biological role in the reaction.

## Performance Indicators/Indicateurs de rendement

1. Amendment to the final report on Frisken Lake by April 1986, to include a year of post treatment data into the '85 interim report. Some of the data will be collected and analyzed by the Fish and Wildlife Branch of B.C.
2. Report on precipitation of phosphate in hardwater lakes.
3. Completion of experimental laboratory work on pyrite formation with samples from Frisken Lake (high pyrite content) and Chain Lake (low pyrite content) (with Dr. P. Manning).

## Relevance/Objet

Response to a request for research needs identified by operational branchs of IWD (83-5161) and the B.C. Department of Environment. Only a specific class of lake will respond well to lime treatment; thus, we hope to improve our ability to discriminate lakes that are appropriate for lime treatment (saturated with calcite) and those that are suitable for lake aeration (have reactive iron).

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 438

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Effect of Contaminants in Nutrient Kinetics | DIVISION AED<br>SECTION |
| KEY WORDS/ MOTS CLEFS | ALGAE, BACTERIA, NUTRIENTS, ACID RAIN, CONTAMINANTS, ECOTOXICOLOGY, EUTROPHICATION, PESTICIDES, COASTAL ZONE, ARCTIC OCEAN | PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Lean, D.R.S. TEL: 637-4221 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | A. Abbott, K. Edmondson | |
| TIME FRAME/ CALENDRIER | START DEBUT 1984 FINISH FIN 1985 | |
| PRIMARY USER/ USAGER PRIMAIRE | RDG's office TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | D. Haffner & W. Traversy - WQB,HQ<br>D. Hallett TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To determine the influence of contaminants on nutrient cycling.
2. Summarize information on influence of coastal zone upwelling on algal growth.
3. Initiate experiments to quantify assimilation rates for nitrate and sulphate from acid rain.
4. To compare 1982 LONAS data with satellite imagery.

## Performance Indicators/Indicateurs de rendement

1. Continue experiments in large lake enclosures on the influence of contaminants (pesticides) on the aquatic ecosystem structure and response in changes in chemical (especially N&P) processes (in collaboration with University of Guelph Toxicology Centre and Applied Biology). In addition the influence of selected contaminants on basic metabolic processes (photosynthesis, phosphate uptake, protein, carbohydrates, and lipid synthesis). This includes experiments on water flown from the Barrow Strait (Arctic Ocean). Report by 31 March 1986.
2. Prepare manuscripts (3) on indicators for plankton nutrient deficiency related to coastal zone, upwelling. Suggest improved methods for surveillance (Lake Ontario and Erie).
3. Preliminary experiments on assimilation rates for sulphate and nitrate in a variety of lakes including acid stressed lakes (to be completed by March 1986, major study to be submitted the following year).
4. If more ground cruises are needed, WQB has invited me to go with their Surveillance cruises. Field experiments completed by October 1, 1985.

## Relevance/Objet

1. Lake productivity altered by nutrient inputs alters influence and disappearance rate of contaminants. Contaminants also alter nutrient cycling rates. Some of these interactions need to be identified.
2. In Lake Ontario and Lake Erie, lake physics sometimes overrides expected nutrient-algal interactions. Management of these lakes requires more complete information.
3. Rates for assimilation of sulphate and nitrate by lake plankton is a prerequisite for estimating long term effects of acid rain and plankton balances.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85-439

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Effect of Calcite Precipitation upon Algal Productivity in Lake Ontario | DIVISION<br>AED |
| KEY WORDS/ MOTS CLEFS | ALGAL GROWTH, EUTROPHICATION, LAKE ONTARIO, PHOSPHORUS, PHOSPHOROUS AVAILABILITY | SECTION<br>NUPROS<br>PAE<br>EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Murphy, T.P.<br>TEL: 637-4602 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>W.Q.<br>Field Camp |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | K. Burnison, S. Esterby, D. Urciuoli, R. Stevens (IWD-OR), O. Johansson (GLFRB), C. Nalewajko (U. Toronto) | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985<br>FINISH FIN March 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | Rob Stevens (IWD-OR)<br>TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET<br>DIRECT-GENERAL |

## Goal/But

1. To improve the analytical determination of particulate Ca.
2. To determine what adsorbs to calcite and what biological reactions modify calcite geochemistry (subject to GLWQA funding).

## Performance Indicators/Indicateurs de rendement

1. Report comparing the two methods of calcium by December 1986.
2. Report on the impacts of calcite precipitation on algal productivity by December 1986.

## Relevance/Objet

Calcite precipitation in Lake Ontario may limit algal growth by decreasing lake phosphorus concentrations. Calculations using phosphorus models indicate that Lake Ontario should be more productive. Precipitation of calcium carbonate has been shown to remove algae and phosphorus from the epilimnion of certain hardwater lakes. Resolution of calcite chemistry could lead to better management of hardwater lakes, i.e. 1) can hardwater lakes tolerate higher phosphorus loading or 2) would the high alkalinity discharge from a sewage treatment plant using lime treatment of sewage result in better posttreatment sedimentation of phosphorus relative to a system that uses iron precipitation? This study was requested by IWD-OR-WQB.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 477

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Eurasian Watermilfoil Control | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | AQUATIC MACROPHYTES, EURASIAN MILFOIL, LITTORAL ZONE | SECTION GRLRHS<br>PAE EAP 1532 |
| STUDY LEADER/ CHEF D'ETUDE | Painter, S. TEL: 637-4382 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1988 | |
| PRIMARY USER/ USAGER PRIMAIRE | IWD Regions TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | B. Fera, Sudbury<br>V. Bartnik, P&YR TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

Based on previous laboratory experiments, initiate field trials for technology transfer of a novel approach to Eurasian watermilfoil control (augmentation of sediment with refractory organic material). To further ensure technology transfer, summarize previous NWRI milfoil research for publication as IWD report.

## Performance Indicators/Indicateurs de rendement

1. In collaboration with MOE, initiate field trials of organic carbon additions to milfoil beds by July 1985.
2. Assess efficiency of field trials by issuing a contract to monitor milfoil growith in plots - preliminary report of field trials by March 1986.
3. Summarize previous NWRI milfoil research for IWD report by March 1986.

## Relevance/Objet

Eurasian watermilfoil is a nuisance aquatic macrophyte infesting many waterways in Canada. Recreational potential of the waters is impaired. Several provincial agencies have requested assistance in developing a long-term environmentally acceptable control for milfoil. Environment Canada's research is aimed towards this goal.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 478

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Aquatic Weeds Coordination and Technology Transfer | |
| KEY WORDS/ MOTS CLEFS | MACROPHYTES, AQUATIC WEEDS, EURASIAN MILFOIL | |
| STUDY LEADER/ CHEF D'ETUDE | Painter, S. | TEL: 637-4382 |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 | FINISH FIN March 1988 |
| PRIMARY USER/ USAGER PRIMAIRE | IWD - HQ | TEL: |
| IWD/DGEI CONTACT | N. James, IWD - HQ | TEL: 997-2109 |

| | |
|---|---|
| DIVISION | AED |
| SECTION | GRLRHS |
| PAE EAP | 1532 |
| SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE | |
| OTHER USERS/ AUTRES USAGERS | |
| INTEREST/INTERET DIRECT-GENERAL | |

Goal/But

1. To assess invasion threat of Hydrilla into Canada.
2. Ensure Technology Transfer of Environment Canada's macrophyte research to other agencies across Canada.
3. Collaborate with Aquatic Plant Management Society in their planned 1st International Symposium on Eurasian watermilfoil to ensure Canadian representation.

Performance Indicators/Indicateurs de rendement

1. Determine geographical extent of Hydrilla in eastern and western United States and determine success of control programs for Hydrilla control in northern areas of U.S. Also determine likely routes of importation of Hydrilla and inform Argiculture Canada by December 1985.
2. Produce quarterly reports for distribution to other aquatic plant managers in Canada discussing recent advancement research programs underway in Canada.
3. The Symposium is to be held in Vancouver, B.C. by informing appropriate agencies and individuals using one of the quarterly reports in 2.

Relevance/Objet

Aquatic macrophytes can be a serious threat to the recreational value of many of Canada's waterways. Coordination of research efforts, promotion of intercommunication among Canadian workers and remaining aware of international activities and plant problems which affect Canadian resources are important activities.

| | | |
|---|---|---|
| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | Study Plan<br>Plan d'étude | NO: 85- 490 |
| STUDY TITLE/ TITRE D'ETUDE | Immediate Bioavailability of Phosphorus in Grand River Sediments | DIVISION AED |
| KEY WORDS/ MOTS CLEFS | PHOSPHORUS, BIOAVAILABILITY, SEDIMENTS, NUTRIENTS, GRAND RIVER, LAKE ERIE, SUSPENDED SOLIDS | SECTION NUPROS<br>PAE EAP 1514 |
| STUDY LEADER/ CHEF D'ETUDE | Abbott, A. TEL: 637-4550 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>GLWQP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | K. Edmondson, D.R.S. Lean | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | G. Wall, RDG TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | R. Stevens, WQB - OR TEL: 637-4641 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To assess immediate bioavailability of suspended sediments in the Grand River in spring runoff, (1) work out experimental design using $^{32}P$ kinetics (March '86), and (2) measure bioavailability of suspended particulate matter from spring runoff (March '87).

Performance Indicators/Indicateurs de rendement

1. (a) Review past research on P bioavailability of suspended sediments (Oct. '85).
   (b) Preliminary sampling of river during spring rush (April '85).
   (c) Michealis-Menten $^{32}P$ series as standard for sediment addition $^{32}P$ uptake experiments (Dec. '85).
   (d) Experiments to work out best method of introducing sediment to spiked algal community (Feb. '86).
2. (a) Collect water from open Lake Erie for use as algal community (April '86).
   (b) Collect water from Grand River; concentrate the suspended sediment (April '86).
   (c) Run $^{32}P$ experiments, paralleling M.M. experiments with sediment addition experiments (Sept. '86).
   (d) Do standard measurements of P bioavailability of sediments and compare (Sept. '86).

Relevance/Objet

Attempted reduction of P loading (Annex III) by reducing erosion will start soon. Agriculture Canada have been studying various soil management practices to reduce loss of topsoil. Lands Directorate is continuing to study and model the soil loss; and WP&M will be studying the reduction in P input to the river be reducing the erosion. This study of the P availability will help quantify the impact of the reduction. This study is related to *Cladophora* tissue P study by Painter, AED 498, and sediment of Lake Erie P content by Manning, AED 428.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 498

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Evaluate Cladophora to Assess Trends in Eutrophication | DIVISION AED<br>SECTION GRLRHS |
| KEY WORDS/ MOTS CLEFS | NEARSHORE, LITTORAL ZONE, AQUATIC MACROPHYTES, GRAND RIVER, LAKE ERIE, PHOSPHORUS, EUTROPHICATION | PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Painter, S. TEL: 637-4382 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | GLWQP |
| PRIMARY USER/ USAGER PRIMAIRE | RDG's Office<br>WQB<br>TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | RDG, OR<br>H. Sloterdijk, Quebec<br>TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Using Cladophora tissue phosphorus concentrations, determine importance of Grand River nutrient plume to Cladophora growth in Eastern L. Erie.

Performance Indicators/Indicateurs de rendement

1. (a) Sample cladophora at 0.5 m depth from Port Dover to Fort Erie on three occasions from mid-June to mid-July.
   (b) Evaluate significance of Grand River loading relative to loading from other sources in the region. Tissue analysis conducted by Sept. '85.

Relevance/Objet

1. Cladophora is an important aesthetic problem in the nearshore zone of the Great Lakes. The cladophora problem in eastern L. Erie is especially bad. The Grand River phosphorus loading is a significant source of loading to the eastern basin but has dramatically been reduced by the closing of IMC (ERCO) in late 1984.
2. Project related to reduction of agricultural loading under Annex 3 GLWQA, by establishing the present effect of the river on nearshore quality in conjunction with studies on the bioavailability of Grand River phosphorus (AED 428, 490).
3. Project relates to reduction of agricultural loading under Annex 3 GLWQA, by establishing the present effect of the river on nearshore quality in conjunction with studies on the bioavailability of Grand River phosphorus (AED 428, 490).

# AQUATIC PHYSICS & SYSTEMS DIVISION

## Aquatic Physics and Systems Division

The Aquatic Physics and Systems Division of the National Water Research Institute conducts a program of research involving experimental measurements, environmental modelling via numerical simulation, and theoretical studies. All of this work is directed towards the goal of understanding the interrelationship of fluxes of dissolved and suspended materials and water movements due to physical processes such as circulation, turbulent mixing and convection, transmission and scattering of light. Since the ecosystematic status of a large lake is direct consequence of the convoluted synthesis of biological and chemical parameters with physical process, it is difficult, if not impossible to interpret biochemical measurements in such lakes without an adequate knowledge of the physical processes modulating such measurements.

These responsibilities are shared among four sections: 1) Physical Limnology, 2) Environmental Simulation, 3) Environmental Optics, and 4) Data Management. The last section is service-oriented and provides computer programming and data management service to the National Water Research Institute.

### Environmental Optics

The work of the Environmental Optics Section is concerned with the experimental and theoretical description of the aquatic environment as depicted by the relationships among the optical properties of a natural water mass and its physical and biochemical behaviour. Direct measurements of the underwater light field are used in conjunction with spectral radiance measurements obtained remotely from optical sensors mounted on ships and satellites to assess the applications of spectro-optical data to water management problems. Reports (R.P. Bukata, J.H. Jerome, and J.E. Bruton) have been recently generated relating the colour of lake water to sediment, chlorophyll, and dissolved organic loading; discussing and intercomparing the optical properties of the Great Lakes (exclusive of Lake Michigan); evaluating the use of transmissometry at NWRI; and presenting the dependency of irradiation and primary production with solar zenith angle.

## STUDIES FOR AQUATIC PHYSICS AND SYSTEMS DIVISION

| SECTION | STUDY | STUDY TITLE | STUDY LEADER | 05/06/86. |
|---|---|---|---|---|
| DIVISION | | | | |
| | 500 | AQUATIC PHYSICS AND SYSTEMS DIVISION MANAGEMENT AND ADMINISTRATION | BUKATA,R.P. | |
| ENVIRONMENTAL SIMULATION | | | | |
| | 501 | WATER QUALITY,RADIONUCLIDE TRANSPORT AND SEDIMENT CONTAMINATION MODELS | LAM,D.C.L. | |
| | 503 | EUTROPHICATION MODEL OF THE UPPER GREAT LAKES CONNECTING CHANNELS | SIMONS,T.J. | |
| | 504 | TOXIC CONTAMINANT MODEL FOR THE LAKE ST. CLAIR SYSTEM | HALFON,E. | |
| | 505 | ASSESSMENT OF NIAGARA RIVER WATER QUALITY | EL-SHAARAWI,A.H. | |
| | 506 | AQUATIC EFFECTS OF ACIDIC PRECIPITATION MODELS AND MONITORING | THOMPSON,M.E. | |
| | 507 | WATERSHED ACIDIFICATION MODELS | LAM,D.C.L. | |
| | 508 | OPERATIONAL ACID PRECIPITATION MODELS - REVIEW AND ENHANCEMENT | FRASER,A.S. | |
| | 509 | MODELLING THERMAL STRUCTURE OF NATURAL WATER BODIES | SCHERTZER,W.M. | |
| PHYSICAL LIMNOLOGY | | | | |
| | 510 | GREAT LAKES CONNECTING CHANNELS-CIRCULATION PATTERNS IN LAKE ST. CLAIR | MURTHY,C.R. | |
| | 511 | STORM SURGE SIMULATION ON LAKE ERIE AND LAKE ST. CLAIR | HAMBLIN,P.F. | |
| | 512 | CIRCULATION WITHIN GREAT LAKES COASTAL ZONES | BOYCE,F.M. | |
| | 513 | TECHNOLOGY TRANSFER AND INFORMATION SERVICES | BULL,J.A. | |
| | 514 | NIAGARA RIVER PLUME | MURTHY,C.R. | |
| | 515 | PHYSICAL LIMNOLOGY OF A YUKON RIVER BASIN LAKE | HAMBLIN,P.F. | |
| ENVIRONMENTAL SPECTRO-OPTICS | | | | |
| | 540 | APPLICATION OF REMOTE OPTICAL MEASUREMENT TO LAKE RESEARCH | BUKATA,R.P. | |
| DATA MANAGEMENT | | | | |
| | 571 | CCIW DATA ARCHIVING | NAGEL,W. | |
| | 572 | WATER QUALITY DATA BASE ADMINISTRATION | COMBA,H. | |
| | 573 | EDP SUPPORT - DATA MANAGEMENT | HODSON,J. | |
| | 574 | MICROCOMPUTER SUPPCRT | BEAL,S. | |
| | 575 | GEMS/UNEP - GLOBAL WATER QUALITY DATA MANAGEMENT | DUFFIELD,R.A. | |

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                                                              DATE RUN  85/05/23.
PROCESSING FORMB FOR DIVISION APSD

   ----ORGANIZATION---- --ENGINEERING---- -----MANTEC------ ---TECH OPS.--- --DM-- ------EXTERNAL---- SHADOW ----------TOTALS-----------
 NO  PY SAL    OM    CAP  PY SAL   OM  CAP  PY SAL   OM  CAP  PY SAL   OM OT PY SAL AG PY SAL   OM  CAP COST    PY SAL   OM   CAP    COST

500 1.0  22  60.0    --   -- --   --   -- .10  3   --   --   -- --   -- -- -- --       -- --   --   --   --  1.10  25  60.0    --    85.4

501 1.5  74   4.0  22.0   -- --   --   --  -- --   --   --   -- --   -- -- .10  3      -- --   --   --   --  1.60  77   4.0  22.0   103.1

503  .7  34   5.0    --   -- --   --   --  -- --   --   --   -- --   -- -- -- --       -- --   --   --   --   .70  34   5.0    --    39.1

504 1.6  81   4.5    --   -- --   --   --  -- --   --   --   -- --   -- -- .15  5      -- --   --   --   --  1.75  85   4.5    --    90.0

505 1.0  52  15.0    --   -- --   --   --  -- --   --   --   -- --   -- -- .20  7      -- --   --   --   --  1.20  59  15.0    --    73.9

506  .5  21   6.J    --   -- --   --   --  -- --   --   --   -- --   -- -- .30 10LRT1.00 53   --   --       1.80  83   6.0    --    89.4

507 1.0  48  12.0    --   -- --   --   --  -- --   --   --   -- --   -- -- .15  5LRT  -- -- 25.0   --       1.15  53  37.0    --    90.4

508  .5  21   7.0    --   -- --   --   --  -- --   --   --   -- --   -- -- .20  7LRT  -- -- 14.0   --        .70  27  21.0    --    48.1

509  .2   9    --    --   -- --   --   --  -- --   --   --   -- --   -- --  -- --CCP  -- -- 15.0  5.0        .20   9  15.0   5.0    29.3

510 2.5 119  18.5    -- .40 14   --   -- 1.37 47  --   -- 1.17 35 13.5 15 .05  2GLH  -- -- 15.0   --
510                                                                   SHADOW BOAT                   76.1  5.49 231  47.0    --   353.7

511  .5  24   2.0    --   -- --   --   --  -- --   --   --   -- --   -- -- .05  2      -- --   --   --   --   .55  25   2.0    --    27.5

512  .5  27   5.0    -- .10  3   --   -- .49 17   --   --  .33 10  1.0  1 .10  3GLH  -- -- 25.0  5.0
512                                                                   SHADOW BOAT                   31.2  1.52  60  31.0   5.0   127.6

513 1.5  55  22.0 178.0   -- --   --   --  -- --   --   --  .08  2   .5 -- .20  7      -- --   --   --   --  1.78  64  22.5 178.0   264.4

514 2.0  89  21.5    --   -- --   --   --  -- --   --   --  .67 20  5.0  5  -- --      -- --   --   --
514                                                                   SHADOW BOAT                   75.7  2.67 114  26.5    --   216.0

515  .5  26   2.0    --   -- --   --   --  -- --   --   --   -- --   -- -- .20  7      -- --   --   --   --   .70  33   2.0    --    34.7

540 3.0 143  19.5    --   -- --   --   --  -- --   --   --   -- --   -- -- .20  7      -- --   --   --   --  3.20 149  19.5    --   168.6

571 2.5  67   5.0  10.0   -- --   --   --  -- --   --   --   -- --   -- -- -- --       -- --   --   --   --  2.50  67   5.0  10.0    81.5

572 1.0  43  15.0    --   -- --   --   --  -- --   --   --   -- --   -- -- -- --       -- --   --   --   --  1.00  43  15.0    --    58.0

573 2.8  72  10.5    --   -- --   --   --  -- --   --   --   -- --   -- -- -- --       -- --   --   --   --  2.80  72  10.5    --    82.5

574  .5  22   3.5    --   -- --   --   --  -- --   --   --   -- --   -- -- -- --       -- --   --   --   --   .50  22   3.5    --    25.0

575  .8  26   3.0    --   -- --   --   --  -- --   --   --   -- --   -- -- -- --       -- --   --   --   --   .80  26   3.0    --    29.4

   26.10    241.0         .50      --     1.96     --     2.25   20.0  1.90     1.00   94.0    183.0     1360       220.0
      1072        210.0      17      --       67      --       68   19.     63       53    10.0      33.71     355.0       2117.5
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|---|---|---|
| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | Study Plan<br>Plan d'étude | NO: 85-500 |

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Aquatic Physics and Systems Division Management and Administration | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | AQUATIC PHYSICS, SYSTEMS ANALYSIS, MODELS, ADMINISTRATION, MANAGEMENT | SECTION APSDIV<br>PAE EAP 1512 |
| STUDY LEADER/ CHEF D'ETUDE | Bukata, R.P. TEL: 637-4212 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | S.M. Tapping | |
| TIME FRAME/ CALENDRIER | START DEBUT FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To develop the research program plan of APSD.
2. To develop a personnel utilization plan for APSD.
3. To develop a personnel training plan for APSD.
4. To develop a financial budget for APSD.
5. To manage and control the program of APSD.

Performance Indicators/Indicateurs de rendement

1. Research program plan developed on schedule.
2. Personnel utilization plan developed within allocations and schedule.
3. Personnel training plan developed within budget and on schedule.
4. Financial plan for APSD developed within allocation.
5. Program plan of APSD carried out, evaluated and reported as per the operation directives of the Institute.

Relevance/Objet

The APSD provides the physical limnology, environmental optics, environmental simulation, remote sensing and data management contributions to the NWRI program plan.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

| | |
|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Water Quality, Radionuclide Transport and Sediment Contamination Models |
| KEY WORDS/ MOTS CLEFS | ENVIRONMENTAL SIMULATION, CONTAMINANTS TRANSPORT, WATER QUALITY, RADIOACTIVITY, SEDIMENTATION |
| STUDY LEADER/ CHEF D'ETUDE | Lam, D.C.L. TEL: 637-4241 |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | T.J. Simons, A.G. Bobba, W.M. Schertzer |
| TIME FRAME/ CALENDRIER | START DEBUT 1983 FINISH FIN 1987 |
| PRIMARY USER/ USAGER PRIMAIRE | RDG - Ont. Reg. TEL: 966-6406 |
| IWD/DGEI CONTACT | R. Stevens, WQB - OR TEL: 637-4641 |

| | |
|---|---|
| NO: | 85-501 |
| DIVISION | APSD |
| SECTION | ENVSIM |
| PAE EAP | 4100 |
| SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE | GLWQP |
| OTHER USERS/ AUTRES USAGERS | MOE |
| INTEREST/INTERET DIRECT-GENERAL | |

## Goal/But

To implement the operational use of models for environment management, to assess the outcome of proposed control strategies, to predict chemical spills, to estimate contaminant loadings, and to interpret monitoring data by recourse to available models and to modify such models as required by the scenarios and to integrate new research results and new field data into these models.

## Performance Indicators/Indicateurs de rendement

1. Documentation and compilation of user's manual of the sediment contamination models; application of these models to radionuclide data in Lakes Huron, Erie and Ontario, report by March 1986 (This is related to NWRI ECD Study No. 240 with Dr. Joshi's proposal to GLWQP).
2. Consultation and update of operational Lake Ontario Water Quality Model with IWD - OR Surveillance data; report as requested.
3. Standby operation of the chemical and tritium spill model, Port Granby Waste Disposal Site model and coastal pollutant transport model. Review and reports will be provided as required by potential users.

## Relevance/Objet

Operational versions of the best available research models are required to assess effects of proposed water management strategies for the Great Lakes. Models of the pathway and transport of radionuclides and contaminants are essential to permit generalization from the experimental data at a particular site and to obtain estimates of the trends and rates of chemical loading. Emergency plan calls for the standby operation of spill models. Potential users are TCMP, EPS-OR, IWD-OR, MOE, Ontario Hydro, Hydro Quebec and IJC Modelling Task Force.

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Study Plan
Plan d'étude

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| | | NO: 85- 503 |
| STUDY TITLE/ TITRE D'ETUDE | Eutrophication Model of the Upper Great Lakes Connecting Channels | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | EUTROPHICATION, GREAT LAKES, MODELS, UPPER LAKES CONNECTING CHANNEL | SECTION ENVSIM<br>PAE EAP 1512 |
| STUDY LEADER/ CHEF D'ETUDE | Simons, T.J. TEL: 637-4218 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | W.M. Schertzer, (M. Charlton & H. Dobson, AED) | |
| TIME FRAME/ CALENDRIER | START DEBUT 1984 FINISH FIN 1987 | GLWQP |
| PRIMARY USER/ USAGER PRIMAIRE | R. Shimizu, Can. Chairman Task Force on UGLCC TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To analyze and interpret the surveillance data from Lake St. Clair to be collected in 1985 by H. Dobson, AED.
2. To analyze and interpret the sediment samples from Lake St. Clair to be collected in 1985 by M. Charlton, AED.
3. To model wind-generated waves on Lake St. Clair using Donelan's wave prediction model.
4. To model sediment resuspension induced by waves and turbulence using physical measurements to be carried out on Lake St. Clair in 1985.
5. To model water movements in Lake St. Clair using circulation models developed at NWRI.
6. To merge the above into a model for nutrient concentrations and transport of suspended and dissolved substances in Lake St. Clair.

Performance Indicators/Indicateurs de rendement

1. A report on the surveillance data and sediment samples.
2. A report on the nutrient concentration/transport model.

Relevance/Objet

This study is part of the IJC program on the Upper Great Lakes Connecting Channels.

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Study Plan
Plan d'étude

NO: 85-504

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Toxic Contaminant Model for the Lake St. Clair System | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | TOXICITY, ENVIRONMENTAL SIMULATION, LAKE ST. CLAIR, MODELS, UPPER LAKES CONNECTING CHANNEL | SECTION ENVSIM<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Halfon, E. TEL: 637-4243 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | T.J. Simons, W.M. Schertzer, (B. Oliver, ECD) | |
| TIME FRAME/ CALENDRIER | START DEBUT 1984 FINISH FIN 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | R. Shimizu, Can. Chairman, Task Force on UGLCC TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | Director, NWRI TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To develop a mathematical model for predicting the fate of toxic contaminants in Lake St. Clair and the St. Clair and Detroit Rivers.
2. To analyze and simulate water movements to be observed in Lake St. Clair during the 1984/85 field program.
3. To study and model physical processes responsible for sediment resuspension in Lake St. Clair.
4. To merge results of the above studies with concurrent studies by AED, ECD and HD in order to develop an integrated model of the UGLCC system.

## Performance Indicators/Indicateurs de rendement

1. A report describing the toxic contaminant model by December 1985.
2. A report on water movements in Lake St. Clair by March 1986.
3. A compartmentalized toxic contaminant model of Lake St. Clair by March 1986.

## Relevance/Objet

This study is part of the IJC program on the Upper Great Lakes Connecting Channels (1984-1987).

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Study Plan
Plan d'étude

NO: 85- 505

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Assessment of Niagara River Water Quality | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | TRENDS, SAMPLING FREQUENCY, DATA ANALYSIS, TRUNCATED DISTRIBUTION, NUTRIENTS, CONTAMINANTS | SECTION ENVSIM<br>PAE EAP 1113 |
| STUDY LEADER/ CHEF D'ETUDE | El-Shaarawi, A.H. TEL: 637-4584 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | K. Kuntz (WQB-OR) | |
| TIME FRAME/ CALENDRIER | START DEBUT 1985 FINISH FIN 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | WQB - OR TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To evaluate spatial and temporal trends in Niagara River water quality data (nutrients and contaminants).
2. To evaluate the available techniques for estimating loading of water quality parameters to Lake Ontario and to determine the conditions of optimality for each technique.
3. To estimate sampling frequency necessary to estimate trends and to determine violations to water quality objectives (pending on GLWQ funds).
4. To hold workshop on the statistical aspects of water quality monitoring (on October 7-10, 1985).
5. To prepare statistical manual for the analysis of water quality data.
6. To provide assistance in the interpretation of data for the project on "Levels and pathways of Radionuclides in the Great Lakes with special reference to $^{99}$Tc" - Project Leader - S.R. Joshi.

## Performance Indicators/Indicateurs de rendement

1. A report or paper summarizing spatial and temporal trends in Niagara River Contaminants data by October 1985 (A.H. El-Shaarawi, M.E. Thompson and K. Kuntz).
2. A report on methods for estimating loadings (A.H. El-Shaarawi, M.E. Thompson and K. Kuntz) by March 1986.
3. A report on sampling design necessary to estimate trends and frequency of violations to water quality objectives (A.H. El-Shaarawi, K. Kuntz) by March 1986.
4. Organization and holding workshop on the statistical aspects of Water Quality Monitoring, October 7-10, 1985.
5. Preparation of a draft for the statistical manual by July 1985 (with Demayo and Esterby).

## Relevance/Objet

This project attempts to answer client needs as well as research needs in the interpretation and improvement of the Great Lakes Surveillance Program.

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Study Plan
Plan d'étude

NO: 85-506

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Aquatic Effects of Acidic Precipitation Models and Monitoring | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | SULFATE, pH, SULFUR, LRTAP, ACID RAIN, MODELS, ACID LAKES, AQUATIC RESOURCES AT RISK, CATION DENUDATION RATE MODEL | SECTION ENVSIM<br>PAE EAP 4200 |
| STUDY LEADER/ CHEF D'ETUDE | Thompson, M.E. TEL: 637-4513 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>LRTAP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | A.S. Fraser | |
| TIME FRAME/ CALENDRIER | START DEBUT 1979 FINISH FIN 1989 | |
| PRIMARY USER/ USAGER PRIMAIRE | F.C. Elder, LRTAP TEL: 637-4212 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | T. Pollock, WQB-AR TEL: 388-6606 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To assess the impact of acid precipitation upon aquatic resources of eastern Canada, develop quantitative assessments of the proportions of such resources at risk at various deposition rates, to evaluate natural background levels of sulfate deposition, and to continue to validate the CDR model.

## Performance Indicators/Indicateurs de rendement

1. Application of the CDR model to organic waters: evaluation of the amount of $A^-$ and the effect of $A^-$ on Gran alkalinity (acidity) titrations. Report by September 1985.
2. Preliminary report on the combined effect of sulphates and nitrate ions on the CDR model by March 1986.
3. Report on error estimates in CDR calculations for rivers with various patterns of discharge and relations of sums of cations to discharge (with A. El-Shaarawi) by March 1986.
4. Report on linkage of the Sensitivity Index to aquatic effects for risk assessment analysis by March 1986.
5. As consultant on monitor data assist in the preparation of an annual report on the LRTAP monitor program in coordination with WQB, Ottawa and Quebec and Atlantic Regions.

## Relevance/Objet

Under the terms of the Canada/U.S. Memorandum of Intent concerning transboundary air pollution, the effects of acid deposition must be quantified and rigorously defined. Modelling activities of rate related effects are vital components of this activity.

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Study Plan
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NO: 85-507

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Watershed Acidification Models | DIVISION APSD<br>SECTION ENVSIM |
| KEY WORDS/ MOTS CLEFS | ACID RAIN, ENVIRONMENTAL SIMULATION, LRTAP, MODELS | PAE EAP 4200 |
| STUDY LEADER/ CHEF D'ETUDE | Lam, D.C.L. TEL: 637-4241 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>LRTAP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | A.G. Bobba, (D. Jeffries, ECD), M. Thompson | |
| TIME FRAME/ CALENDRIER | START DEBUT 1982 FINISH FIN 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | F.C. Elder, LRTAP TEL: 637-4212 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | T.A. Clair, WQB-AR TEL: 388-6606 | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To extend and verify the Turkey Lakes hydrological model for other watersheds in Canada; to define and compare the pathways in these watersheds in relation to the contact and residence times of sulphate and major ions.
2. To continue development of hydro-geochemical acidification and water quality model components affecting the pH, alkalinity and major ions, leading to estimates of stress-response relationships.

## Performance Indicators/Indicateurs de rendement

1. A report on comparison and verification of computed watershed hydrological pathways with data from Turkey Lakes, Doreset, Lac Leflamme and Mersey River areas, pending on data availability, by March 1986.
2. A report on the interfacing of hydro-geochemical acidification model with hydrological models and preliminary analysis of acid load stress-response relationships, by March 1986.

## Relevance/Objet

The primary requirement of the Canada - U.S. Memorandum of Intent concerning Transboundary Air Pollution is the specification of ecosystem tolerance and response to LRTAP stresses. The modelling efforts are necessary to synthesize the information into comprehensive regime response simulation. This model synthesis is necessary to provide the needed linkage of LRTAP stress and aquatic regime response in a basin systems scale.

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NO: 85- 508

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Operational Acid Precipitation Models: Review and Enhancement | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | LRTAP, ACID RAIN, MONITORING, MODELS | SECTION ENVSIM<br>PAE EAP 4200 |
| STUDY LEADER/ CHEF D'ETUDE | Fraser, A.S. TEL: 637-4513 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | LRTAP IV |
| PRIMARY USER/ USAGER PRIMAIRE | F.C. Elder TEL: 637-4212 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | T. Dafoe, IWD, HQ TEL: 997-3422 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To evaluate the Cation Denudation Rate (CDR) model under varied conditions in the Province of Quebec, determining the applicability of modifying factors upon the model.

Performance Indicators/Indicateurs de rendement

1. Assessment of existing CDR model and comparison with other models of acid sensitivity such as those developed under APSD study 506 determining modifying factors for model enhancement, report by March 1986.
2. To provide consultation and advice in the development of an interpretive report on LRTAP monitoring data, report due by March 1986

Relevance/Objet

Under the terms of the Canada-U.S. Memorandum of Intent concerning transboundary air pollution the evaluation and interpretation of the data bases in concert with applications of models of acid sensitivity will provide the basis of policy development.

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| NO: 85- 509 | |
| DIVISION | APSD |
| SECTION | ENVSIM |
| PAE<br>EAP | 1532 |
| SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE | CCP |
| OTHER USERS/ AUTRES USAGERS | |
| INTEREST/INTERET | DIRECT-GENERAL |

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Modelling Thermal Structure of Natural Water Bodies | |
| KEY WORDS/ MOTS CLEFS | CLIMATE, MODELS, THERMAL STRATIFICATION, THERMOCLINE, TEMPERATURE, STRATIFICATION CYCLES, THERMODYNAMICS | |
| STUDY LEADER/ CHEF D'ETUDE | Schertzer, W.M. | TEL: 637-4218 |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | T.J. Simons, D.C.L. Lam | |
| TIME FRAME/ CALENDRIER | START DEBUT 1984 | FINISH FIN 1987 |
| PRIMARY USER/ USAGER PRIMAIRE | M. Quast, WRB-HQ | TEL: 994-1933 |
| IWD/DGEI CONTACT | M. Quast, WRB-HQ | TEL: 994-1933 |

Goal/But
~~Update~~ stratification models and verify with available information on seasonal and long term variations of thermal structure of large lakes. Use the models to reconstruct historic variations of stratification cycles due to climate weather changes.

Work Plan

1. To extend historical analyses of surface heat flux and components in Lake Ontario to the period 1950 to 1966 using available data for use in stratification models.
2. To run existing NWRI stratification models on historical data sets on Lake Erie and Lake Ontario 1950 to 1983, modifying a range of parameter values to provide verification and validation against available date.
3. To provide graphical and statistical summaries to depict pertinent characteristics of distributions such as surface, mean epilimnion, and mean hypolimnion temperatures, thermocline depths and mesolimnion thicknesses.
4. To run verified and validated models for the complete historical data sets of Lake Erie and Lake Ontario 1950-1983 to establish the climatological characteristics of the thermal structure of these lakes.
5. To develop improved models to predict winter-time water temperature and ice extent on Lake Erie and to compare results to available observations (depending on funding).

Performance Indicators/Indicateurs de rendement

1. A report on the historical simulation "climatology" of thermal structure of Lake Ontario.
2. A report on the historical simulation climatology of thermal structure of Lake Erie Central and Eastern Basins.
3. A report on modelling winter-time surface temperature and ice extent on Lake Erie (depending on funding).

Relevance/Objet

1. One of the major objectives of the CCP is to develop a coupled atmosphere-ocean circulation model for climatic time scales. Development and verification of the vertical temperature structure component of the model as handicapped by deficiency of oceanic data but can be accomplished by recourse to the extensive data base available for the Great Lakes.
2. Climatic variations of the surface energy balance and the thermal structure (thermocline), will alter nutrient fluxes, oxygen conditions and primary production of water bodies. Combining climatic data (Phase 1, APSD 84-509), thermodynamic models and sediment chemistry data may lead to understanding water quality responses to climatic variations.

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Study Plan
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NO: 85- 510

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Upper Great Lakes Connecting Channels - Circulation Patterns in Lake St. Clair | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | GREAT LAKES, CIRCULATION, LAKE ST. CLAIR, UPPER LAKES CONNECTING CHANNEL | SECTION PHYLIM<br>PAE EAP 1512 |
| STUDY LEADER/ CHEF D'ETUDE | Murthy, C.R. TEL: 637-4235 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J.A. Bull, F.M. Boyce, K.C. Miners, F. Chiochio | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1984 FINISH FIN March 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | RDG-OR TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | Dr. G.K. Rodgers TEL: 637-4265 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To measure summer and winter circulation patterns in Lake St. Clair so that the water quality effects of the various water models entering lake can be estimated.

Performance Indicators/Indicateurs de rendement

1. Conduct three field experiments from May - July 1985, August - October 1985, and November 1985 - March 1986 to measure continuous time series currents, winds and water levels changes by installing 14 current meter moorings, 4 tide gauge stations, six meteorological stations (four on water and two land).
2. Conduct six Lagrangian experiments using 6-8 satellite tracked and conventional drifters in May, June, July, August, September and October to trace the origin of water masses entering Lake St. Clair via the main channels of the St. Clair River.
3. Conduct specialized experiments to measure the rate of suspension in Lake St. Clair using M-CATS, CATS MET II, Wave Rider, HD Motion Package, sediment traps.
4. Prepare climatological report summarizing the summer circulation data.

Relevance/Objet

Upper Great lakes Connecting Channels has been delegated as a class "A" area of concern both from Toxic Contaminants and Eutrophication by the IJC/WQB.

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Plan d'étude

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|---|---|---|
| | | NO: 85- 511 |
| STUDY TITLE/ TITRE D'ETUDE | Storm Surge Simulation on Lake Erie and Lake St. Clair | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | STORM SURGE FORECASTING, UPPER LAKES CONNECTING CHANNEL, LAKE ERIE, LAKE ST. CLAIR | SECTION PHYLIM<br>PAE EAP 1512 |
| STUDY LEADER/ CHEF D'ETUDE | Hamblin, P.F. TEL: 637-4 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Members of Phylim Section | |
| TIME FRAME/ CALENDRIER | START DEBUT 1985 FINISH FIN 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | Department of Transport, TEL: 369-3635 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To apply and further extend a storm surge model to select storms over the 1985-1987 field study period with particular attention to the Western Basin of Lake Erie and Lake St. Clair and the estimates of bottom stress from the model.

Performance Indicators/Indicateurs de rendement

1. Review of existing modelling of Lake St. Clair.
2. Preliminary testing with key storm data supplied by Ontario Hydro on Lake Erie.
3. Application of model to NWRI data collected on Lake St. Clair and on Lake Erie when the data become available.

Relevance/Objet

1. Department of Transport have indicated a need for improved storm surge forecasting on Lake Erie for navigational purposes.
2. A need has been identified for improved knowledge of the circulation and bottom stress field of the Western Basin of Lake Erie and of Lake St. Clair.

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Study Plan
Plan d'étude

NO: 85-512

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Circulation within Great Lakes Coastal Zones | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | GREAT LAKES, LIMNOLOGY, COASTAL ZONE, CIRCULATION, LAKE ONTARIO, CURRENTS, SURFACE SLOPES, BOTTOM STRESS, SEDIMENT RESUSPENSION, ENERGY | SECTION PHYLIM<br>PAE EAP 1512 |
| STUDY LEADER/ CHEF D'ETUDE | Boyce, F.M. TEL: 637-4277 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>GLWQP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | P.F. Hamblin, J. Bull, K. Miners | |
| TIME FRAME/ CALENDRIER | START DEBUT 1982 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | IWD Ontario Region TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To complete analysis of data collected on north shore of Lake Ontario in 1982 and 1984 (GVAPS, MCATS, DPDX, current winds, temperatures). To demonstrate effectiveness of GVAPS profiling instrumentation. To extend DPDX apparatus to 2 dimensional (GRADP) autonomous moored device. To develop bottom boundary layer array (design, preliminary construction). Support requested from GLWQP.

Performance Indicators/Indicateurs de rendement

1. Scientific report leading to journal publications by 31/03/86.
2. Prototype GRADP apparatus for late fall field test. Report by 31/03/86.
3. Design and preliminary construction of bottom boundary layer instrumentation will draw on SEDWG study of 1984. Subject to GLWQP assistance.

Relevance/Objet

Coastal zones are the areas of most immediate concern to managers and users. Residence time of nutrients and contaminants in coastal zone introduced at shorelines (both point and diffuse) sources determines water quality nearshore. Residence time depends on physical processes addressed by this study (upwelling, lateral mixing, sediment resuspension). Results from new instrumentation such as GVAPS, GRADP, BBA offer potential or increased insight into physical processes, improved interpretation of biochemical experiments, and improved water quality modelling. These instruments may be useful in the 2nd year of the Lake St. Clair study. Highly relevant to priority issues of GLWQP Eutrophication Issues Group. Information useful for assessment of environmental impact of power development. Relevant to IJC/GLWQA items 104, 109, IJC/SAB items 218, 201, IJC/WQB items 326, 320 and programs of Ontario MOE and MNR.

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NO: 85-513

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Technology Transfer and Information Services | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | GREAT LAKES, CURRENTS, TEMPERATURE, DATA BASES, LAKE ONTARIO, WIND, CLIMATE | SECTION PHYLIM<br>PAE EAP 1512 |
| STUDY LEADER/ CHEF D'ETUDE | Bull, J.A. TEL: 637-4225 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Staff of APSD | |
| TIME FRAME/ CALENDRIER | START DEBUT FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | IWD, Ontario Region TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To provide an NWRI wide service in the reduction, formatting and editing of the field tapes from the NWRI common user current meter stock, and for the NWRI tide gauges, FTP and CATS systems. Data are processed on request and subject to established priorities.
2. To provide information (data and interpretation) on the distribution of currents and temperatures in the Great Lakes. Agencies served are typically other federal and provincial agencies, universities, consulting engineering firms, lake Ontario Charter Boat Operators, shipping interests, etc.
3. To provide technical consultation on physical data measurements and the analysis of the resulting data bases. An example here is the assistance in the implementation of storm surge forecasting models (HRD study, MOT commission).
4. Support to tape transcribing and editing equipment, including maintenance contract, repairs, maintenance, etc.
5. Capital procurement for APSD.

## Performance Indicators/Indicateurs de rendement

1. Data bases under item 1 and 2 above available for analysis on an agreed priority basis.
2. Other reports as required.

## Relevance/Objet

There are many request for information on winds, temperature structure and currents from users among the groups named above. Some of these are routinely serviced, others are met by special processing or could be met by a Climatic Atlas. The NWRI data base on physical properties of the Great Lakes is the most complete available in the Great Lakes basin and is therefore in demand by users that include Federal and Provincial agencies, Ontario Hydro, Consulting Engineering Firms, and special activities.

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Study Plan
Plan d'étude

NO: 85-514

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|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Niagara River Plume | | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | NIAGARA RIVER, LAKE ONTARIO, LAGRANGIAN, CONTAMINANTS, TRANSPORT | | SECTION PHYLIM<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Murthy, C.R. | TEL: 637-4235 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>GLWQA |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J.A. Bull, K.C. Miners, I. Stepien (PDF), D.C.L. Lam, M. Kerman, D.G. Robertson | | |
| TIME FRAME/ CALENDRIER | START DEBUT 1982 FINISH FIN 1986 | | |
| PRIMARY USER/ USAGER PRIMAIRE | P.P. Yee, WP&M - OR | TEL: 637-4711 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To analyze and synthesize Lagrangian drifter and EBT data bases from FY 1984/85 experiments in a format compatible for the interpretation of the movements of contaminants in Niagara River (NR) plume.
2. To plan and conduct three field experiments in support of ECD-220 study plan. To measure the contamination of L. Ontario by persistent organics and toxic substances from Niagara River plume.
3. To interface the seasonal circulation and transport models of Niagara River plume and L. Ontario with the biochemical and contaminant distributions.

Performance Indicators/Indicateurs de rendement

1. Data report of the FY 1984/85 NR plume experiments to be prepared by December 1985.
2. Conduct three field experiments designed to look at the large scale influence of NR plume on L. Ontario using conventional and remotely tracked drifters.
3. Report summarizing the physical, biochemical, and toxic contaminants transport models to be completed by March 1986.

Relevance/Objet

The Niagara River has been identified as a critical and potentially serious source of toxic contaminants to Lake Ontario. An understanding of the processes by which these contaminants would be reactive in the lake is vital to a management program. The results of this research are of interest to the Niagara Task Force (Ontario, RDG), the GLWQP and other public bodies having concern for the Lake Ontario Contamination from the Niagara River.

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NO: 85-515

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Physical Limnology of a Yukon River Basin Lake | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | ENVIRONMENTAL SIMULATION, CURRENTS, ICE COVER, LAKES, WATER QUALITY | SECTION PHYLIM<br>PAE EAP 1512 |
| STUDY LEADER/ CHEF D'ETUDE | Hamblin, P.F. TEL: 637-4277 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT 1983 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | IWD, WP&M, HQ TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. Analysis of field data collected in March 1985 at Lake Laberge, Y.T. by March 1986.
2. Completion of simulation model of Lake Laberge field data by march 1986.

## Performance Indicators/Indicateurs de rendement

1. Report on field data and analysis.
2. Report on simulation of annual thermal structure.

## Relevance/Objet

Establishing the ecological sensitivity of northern lakes and reservoirs to resource developement is identified as a national priority (i.e. ECS Strategic Plan (1982/87) "begin research into the impacts of major water diversions and the impacts of hydroelectric development in northern areas"). Knowledge gained may be applied to other lake-river systems. This study relates to the NWRI Pacific and Yukon Region program.

09/84

FORM A, PART 1/FORMULE A, PARTIE 1

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-540

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Application of Remote Optical Measurement to Lake Research | | DIVISION APSD |
| | | | SECTION ENVOPT |
| KEY WORDS/ MOTS CLEFS | SATELLITE, REMOTE SENSING, PLUME DYNAMICS, MARSHLAND | | PAE EAP 1512 |
| STUDY LEADER/ CHEF D'ETUDE | Bukata, R.P. | TEL: 637-4670 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J.H. Jerome, J.E. Bruton | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 | FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | IJC, IWD | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | Dr. G.K. Rodgers | TEL: 637-4625 | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To obtain and apply existing satellite data to an analysis of (a) temporal change in Great Lakes marshlands, (b) sediment transport within the Lake St. Clair/St. Clair River system, and (c) dynamic plume configuration from the Niagara River.

Performance Indicators/Indicateurs de rendement

1. Procurement of required LANDSAT data in both imagery and CCR formats.
2. Development and validation of Required Software.
3. Niagara River plume report.
4. Lake St. Clair Report.
5. Preliminary coastal marshland report.

Relevance/Objet

This research has considerable client/user interest and support. Some of the planned activities are a consequence of direct requests from IJC, and some of the activities are a response to ECS/IWD and IJC interests in the Niagara River and Upper Great Lakes Connecting Channels programs.

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Study Plan
Plan d'étude

NO: 85-571

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | CCIW Data Archiving | DIVISION<br>APSD |
| | | SECTION<br>DATA M |
| KEY WORDS/ MOTS CLEFS | GREAT LAKES, SURVEILLANCE, DATA MANAGEMENT, DATA, HISTORICAL | PAE<br>EAP 1113 |
| STUDY LEADER/ CHEF D'ETUDE | Nagel, W.<br>TEL: 637-4536 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J. Byron, J. McAvella | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985<br>FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. Provide scientific data gathering, reduction, transcription and editing services for the Great Lakes Surveillance program, (Meteorological Buoy Data Editing) a solar radiation network and a toxic contaminants measurement program.
2. Provide archiving facilities and services for all scientific data gathered at NWRI and assist in data collection and reduction requirement reviews.
3. Provide for data security.
4. Provide data documentation and reference systems and retrieval assistance or services.

## Performance Indicators/Indicateurs de rendement

1. Coordination and liaison will be maintained between sample acquisition and analytical service agencies to ensure complete, timely and accurate data input to systems. Analog data will be reduced and transcribed to digital scientific units. Data will be converted to processible media, followed by quality control and editing using batch and on-line computer methods.
2. Edited data will be added to matching processible media and source records will be archived and catalogued to standard procedures while maintaining access to data bases at all times.
3. Data will be protected against loss or modifications by microfilming or microfiching and back up tape file storage in fireproof vaults.
4. Data are documented as to discrepancies, anomalies and history. Users are guided in defining and obtaining data sets relevant to their projects. Data are retrieved using relevant selection criteria, and supplied on various media to authorized agencies or personnel. Generalized programs are run to produce a variety of standard and custom designed data statistics and displays.

## Relevance/Objet

Water quality data are required for problem analysis, interpretation of environmental dynamics, reporting ambient conditions, establishing trends, making projections and international exchange on a reliable and timely basis. Maintenance of a complete and reliable archive is vital to historical analysis of environmental concerns

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Study Plan
Plan d'étude

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Water Quality Data Base Administration | |
| KEY WORDS/ MOTS CLEFS | DATA MANAGEMENT, EDP CONSULTATION, SYSTEMS ANALYSIS | |
| STUDY LEADER/ CHEF D'ETUDE | Comba, H. | TEL: 637-4671 |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Data Management Staff | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 | FINISH FIN March 1986 |
| PRIMARY USER/ USAGER PRIMAIRE | | TEL: |
| IWD/DGEI CONTACT | | TEL: |

| | |
|---|---|
| NO: | 85-572 |
| DIVISION | APSD |
| SECTION | DATA M |
| PAE EAP | 1516 |
| SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE | |
| OTHER USERS/ AUTRES USAGERS | |
| INTEREST/INTERET DIRECT-GENERAL | |

Goal/But

1. Support and maintain corporate data bases, and facilitate data analysis and interpretation of water quality data.
2. Provide for operational accessibility to current and historical data acquired by the centre.
3. Provide for the security of data bases.
4. Install and maintain the current version of S2K.
5. Acquire and manage new data bases in support of federally mandated programs.
6. Provide for the orderly development of management strategies for environmental data.

Performance Indicators/Indicateurs de rendement

1. The data base systems should remain accessable to the scientific research community and provide standard programs to facilitate data analysis.
2. Prepare appropriate operational documentation or policy proposals for the data bases.
3. Damaged data bases will be restored within 48 hours by regeneration from current operational backups of the data.
4. Install, test and implement new versions of the S2K within one month of receiving them.
5. New data bases will be developed in a timely and efficient manner to meet requirements for new approved program initiatives.
6. Participate in meetings or assume delegated responsibility on internal or departmental committees and work groups engaged in the development of plans and policy recommendations in relation to the management of environmental data.

Relevance/Objet

This work is necessary to fulfil the desired aims of established programs and new initiatives, to maintain corporate data bases and to identify and enunciate the implications of various alternative strategies available to CCIW management groups. It also provides facilities for timely access to data and convenient analytical and interpretive tools for scientists.

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Study Plan
Plan d'étude

NO: 85-573

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | EDP Support - Data Management | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | EDP SUPPORT, DATA MANAGEMENT | SECTION DATA M<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Hodson, J. TEL: 637-4628 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Head of Data Management and staff | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To provide computer based systems development support to approved CCIW activities by scheduling and monitoring the work.
2. To provide professional EDP consultation.
3. To provide adequate training to DM staff as resources permit and to provide training to the computer users to give them a basin knowledge and to ensure efficient utilization of the central computing facilities.

Performance Indicators/Indicateurs de rendement

1. Work schedule will be distributed and time spent will be monitored, recorded and posted monthly. The schedules will be altered to ensure work load leveling and to meet the changing needs of CCIW. Analysis of the requirements, priority, and time scheduled and a review of existing software will be made before work is begun. The final product will be returned to the end user. Software will be written using self documenting techniques.
2. EDP consulting services will be maintained to solve short term problems and to encourage efficient use of limited resources with emphasis on large consultation requests where the work is being done by the end user.
3. Continue training programs as funds permit to keep DM staff technologically abreast. Continue to provide introductory and advanced courses for computer users as needed and give more personalized courses when warranted.

Relevance/Objet

The need has previously be identified for centralized programming support to ensure efficient utilization of the CCIW computer. Expertise in various areas of endeavour are developed. Duplication of effort is avoided by standardizing procedures. Programming support is provided to people who do not have the skills or the time or a requirement for a full time person to do the work. Effort is expended in direct support of all agencies at CCIW.

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|---|---|---|
| **NATIONAL WATER RESEARCH INSTITUTE**<br>**L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX** | **Study Plan**<br>**Plan d'étude** | **NO: 85-** 574 |

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|---|---|---|---|
| **STUDY TITLE/ TITRE D'ETUDE** | Microcomputer Support | | **DIVISION** APSD |
| **KEY WORDS/ MOTS CLEFS** | COMPUTER, EDP SUPPORT | | **SECTION** DATA M<br>**PAE EAP** 1516 |
| **STUDY LEADER/ CHEF D'ETUDE** | Beal, S. | **TEL:** 637-4373 | **SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE** |
| **TEAM MEMBERS/ MEMBRES D'EQUIPE** | Data Management Staff | | |
| **TIME FRAME/ CALENDRIER** | **START DEBUT** April 1985 | **FINISH FIN** March 1986 | |
| **PRIMARY USER/ USAGER PRIMAIRE** | | **TEL:** | **OTHER USERS/ AUTRES USAGERS** |
| **IWD/DGEI CONTACT** | | **TEL:** | **INTEREST/INTERET DIRECT-GENERAL** |

## Goal/But

1. To develop and present a IBM PC related microcomputer course.
2. To provide for consultation regarding microcomputer applications at CCIW.
3. To maintain an up-to-date knowledge of micro-computer software.

## Performance Indicators/Indicateurs de rendement

1. The course shall be developed by September 1985.
2. Software updates are to be installed shortly after their receipt.
3. Microcomputer consulting services will be maintained to solve short term problems and to encourage efficient use of limited resources.

## Relevance/Objet

With the increase use of microcomputers in CCIW it is necessary to a) provide training, and b) have a resource person to provide advice and guidance to users. This will allow user to better meet their program requirements.

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Study Plan
Plan d'étude

NO: 85-575

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | GEMS/UNEP - Global Water Quality Data Management | DIVISION APSD |
| KEY WORDS/ MOTS CLEFS | GLOBAL, WATER QUALITY, DATA MANAGEMENT, INTERNATIONAL RELATIONS, GLOBAL ENVIRONMENTAL MONITORING SYSTEM | SECTION DATA M<br>PAE EAP 1170 |
| STUDY LEADER/ CHEF D'ETUDE | Duffield, R.A. TEL: 637-4292 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | W. Nagel, J. Byron | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To maintain, operate and enhance, an expanding globally centralized computer based storage and retrieval system for surface and groundwater quality data.
2. Provide for file security and controlled access.
3. Provide standard and selective data retrieval and information processing services on demand.
4. Provide training and consultation services.

## Performance Indicators/Indicateurs de rendement

1. Systematic procedures will be maintained to handle irregular submissions of global water quality monitoring data from six international regions covering the earth, converting data to locally processible media from forms, listings, cards or magnetic tapes as received.
2. Data files will be updated and relevant data base management files covering station history, parameter dictionary and global water quality data will be generated and regularly and securely archived.
3. Supplementary software will be developed as required for the retrieval, summarization and display of the data and to respond to scientific and operational enquiries from 152 countries.
4. Training materials and services will be provided as required at Regional Centres in other countries. Consultation services will be provided on request.

## Relevance/Objet

NWRI has accepted responsibility to develop, implement and operate data base management facilities for the human health related Global Water Quality monitoring project sponsored by UNEP/WHO/UNESCO/WMO, and provide relevant expertise on request.

# ANALYTICAL METHODS DIVISION

## Analytical Methods Division

The mandate of the Analytical Methods Division is to advance knowledge, establish and maintain expertise and provide information on analytical chemistry and microbiology. Providing information includes analytical methodology support to IWD operational laboratories, NWRI scientists, the Great Lakes Water Quality Program, the Toxic Chemicals Management Program, the Long Range Transport of Airborne Pollutants Program and other clients, and implementing interlaboratory quality assurance programs for regional, national, LRTAP, and GLWQP laboratories. In this respect we can be considered a combined research division and national standards laboratory.

The Division is responsible for long and short term research to advance knowledge of chemical and microbiological methodologies, including sample collection and preservation techniques, in water, suspended material, sediment, effluents and biota. Technology transfer of completed methods to the IWD operational laboratories or other clients such as federal, provincial, university and industrial laboratories as well as international standards agencies is considered an integral part of any development study. In the case of the WQB, the methodology is transferred to the National and Regional Laboratories and included in the WQB Analytical Methods Manual. Specification statements for precision, accuracy and reliability for this manual are also prepared by AMD staff. The Microbiological Laboratories Section publishes and maintains its own manual, "Methods for Microbiological Analysis of Waters, Wastewaters and Sediments Manual". This document is used by water quality laboratories in many countries (current distribution list - over 600).

The Division also offers limited analytical support to other scientists within CCIW requiring specialized equipment or facilities which are only available within the Analytical Methods Division. Such support includes high resolution gas chromatography-mass spectrometry, high pressure liquid chromatography, flow injection analysis, use of the Clean and Hazardous Chemicals Laboratory and various microbiological services.

## STUDIES FOR ANALYTICAL METHODS DIVISION

85/05/31.

| SECTION | STUDY | STUDY TITLE | STUDY LEADER |
|---|---|---|---|
| DIVISION | | | |
| | 600 | ANALYTICAL METHODS DIVISION MANAGEMENT AND ADMINISTRATION | LAWRENCE, J. |
| ANALYTICAL CHEMISTRY RESEARCH | | | |
| | 601 | SUPERCRITICAL FLUID CHROMATOGRAPHY - APPLICATIONS TO N-CONTAINING PAHS | ONUSKA, F.I. |
| | 602 | SAMPLE INTRODUCTION ON SYSTEMS FOR ATOMIC SPECTROSCOPY ON G.C. | GOULDEN, P.D. |
| | 603 | ELECTROCHEMISTRY AND FLOW INJECTION ANALYSIS IN WATER | SEKERKA, I. |
| | 604 | METHODS FOR TOXAPHENES, PHTHALATES AND SULFUR CONTAINING COMPOUNDS | SCOTT, B.F. |
| | 605 | GENERAL MAINTENANCE AND TECHNOLOGY TRANSFER | SEKERKA, I. |
| | 610 | DETERMINATION OF NITROGEN-CONTAINING PAHS (AZA-ARENES) | ONUSKA, F.I. |
| | 611 | OPERATION OF CLEAN HAZARDOUS CHEM. LAB. & SEPARATION OF TRACE ORGANICS | SEKERKA, I. |
| | 612 | RADIOIMMUNOASSAY TECHNIQUES FOR DIOXINS | SHERRY, J.P. |
| MICROBIOLOGY LABORATORIES | | | |
| | 621 | MEDIA, WASH-UP, INSTRUMENT AND GENERAL SUPPORT | MCINNIS, R. |
| | 622 | MICROBIAL STUDIES OF GREAT LAKES | DUTKA, B.J. |
| | 623 | MICROBIAL TOXICITY SCREENING METHODS, EVALUATION AND TESTING | DUTKA, B.J. |
| | 624 | BACTERIAL TOXICITY SCREENING SYMPOSIUM | DUTKA, B.J. |
| | 625 | MICROBIAL AND TOXICANT SCREENING SUPPORT TO IWD AND NWRI STUDIES | KWAN, K.K. |
| | 626 | MICROBIAL RESPONSE TO LOADINGS | RAO, S.S. |
| | 627 | ORGANIC MATTER BIODEGRADATION IN LAKE SEDIMENTS-EFFECT OF ACID STRESS | RAO, S.S. |
| QUALITY ASSURANCE METHODS | | | |
| | 642 | ORGANIC METHODS DEVELOPMENT | STOKKER, Y.D. |
| | 643 | WQB AND PPWB QUALITY ASSURANCE PROGRAM | ALKEMA, H. |
| | 644 | CERTIFIED REFERENCE MATERIALS, PRESERVATION, AND NATIONAL Q.C. STUDY | CHEAM, V. |
| | 645 | FEDERAL/PROVINCIAL QUALITY ASSURANCE PROGRAM | CHAU, A.S.Y. |
| | 646 | PRESERVATION OF ORGANICS | LEE, H.B. |
| | 650 | IJC QUALITY CONTROL (INTERLAB STUDIES) | ASPILA, K.I. |
| | 651 | LRTAP INTERLABORATORY QUALITY CONTROL STUDIES | ASPILA, K.I. |
| | 652 | QUALITY ASSURANCE PROGRAM - DREDGING | LEE, H.B. |
| | 653 | QUALITY ASSURANCE PROGRAM AND CRM DEVELOPMENT FOR ORGANICS | LEE, H.B. |
| | 654 | QUALITY ASSURANCE PROGRAM - UGLCCS | CHAU, A.S.Y. |
| COMPUTER SERVICES | | | |
| | 670 | COMPUTER SERVICES FOR WATER MANAGEMENT RESEARCH | PULLEY, H.C. |

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PROCESSING FORMB FOR DIVISION AMD                                    DATE RUN  85/05/23.

   ----ORGANIZATION---- --ENGINEERING---- -----MANTEC------ ---TECH OPS.--- --DM-- ------EXTERNAL---- SHADOW ----------TOTALS----------
 NO  PY SAL   OM   CAP  PY SAL   OM  CAP  PY SAL   OM  CAP  PY SAL   OM OT PY SAL AG PY SAL   OM  CAP COST    PY SAL   OM   CAP  COST

600 2.0  77  70.0   --  -- --   --   --  .21  7   --   --  -- --   -- -- -- --     -- --   --   --   --   2.21  84  70.0   --  154.1

601  .6  28  11.0  9.9  -- --   --   --  -- --    --   --  -- --   -- -- -- --     -- --   --   --   --    .60  28  11.0  9.9   48.7

602 1.6  74  10.0 39.3  -- --   --   --  -- --    --   --  -- --   -- -- -- --     -- --   --   --   --   1.60  74  10.0 39.3  123.3

603 1.5  65  10.0 37.6  -- --   --   --  -- --    --   --  -- --   -- -- -- --     -- --   --   --   --   1.50  65  10.0 37.6  113.0

604 1.6  66   5.0  9.2  -- --   --   --  -- --    --   --  -- --   -- -- -- --     -- --   --   --   --   1.60  66   5.0  9.2   79.8

605 1.9  78  10.0 10.0  -- --   --   --  -- --    --   --  -- --   -- -- -- --     -- --   --   --   --   1.90  78  10.0 10.0   97.9

610 1.0  41  29.0 66.0  -- --   --   --  -- --    --   --  .02 1   .2 -- -- --     -- --   --   --   --   1.02  42  29.2 66.0  136.8

611  .8  33   7.0 25.0  .10 3   --   --  .09  3   --   --  -- --   -- -- -- --     -- --   --   --   --    .99  39   7.0 25.0   71.3

612  -- --    6.0  5.0  -- --   --   --  -- --    --   --  -- --   -- -- -- --GLW  -- --  9.0   --
612                                                                            WQB1.00 41   --   --         1.00  41  15.0  5.0   61.0

621 1.0  41  32.9  5.0  -- --   --   --  -- --    --   --  -- --   -- -- -- --     -- --   --   --   --   1.00  41  32.9  5.0   78.9

622 1.4  57   2.9 10.0  -- --   --   --  -- --    --   --  .20 6  3.3 -- -- --     -- --   --   --   --   1.55  63   6.2 10.0   79.7

623  .1   4   5.5   --  -- --   --   --  -- --    --   --  -- --   -- -- -- --     -- --   --   --   --    .10   4   5.5   --    9.6

604  .2   8   1.2   --  -- --   --   --  -- --    --   --  -- --   -- -- -- --     -- --   --   --   --    .20   8   1.2   --    9.4

625 1.3  53   7.2   --  -- --   --   --  -- --    --   --  -- --   -- -- -- --     -- --   --   --   --   1.25  53   7.2   --   60.5

626 1.1  45   3.5   --  -- --   --   --  -- --    --   --  .16 5   .2  3 -- --     -- --   --   --
626                                                                  SHADOW BOAT                    19.5   1.26  53   3.7   --   76.5

627 1.0  41   5.0   --  -- --   --   --  -- --    --   --  .25 8  2.5  1 -- --LRT  -- --  8.0  4.5
627                                                                  SHADOW LAUNCH                   1.5   1.25  50  15.5  4.5   71.2

642 1.2  49  10.0  5.0  -- --   --   --  -- --    --   --  -- --   -- -- -- --     -- --   --   --   --   1.20  49  10.0  5.0   72.2

643 1.1  45   8.0  1.0  -- --   --   --  -- --    --   --  -- --   -- -- .25  8    -- --   --   --
643                                                                  SHADOW NWQL                     0.0   1.35  53   8.0  1.0   62.4

644 1.1  45  17.0 30.0  -- --   --   --  -- --    --   --  -- --   -- -- -- --     -- --   --   --   --   1.10  45  17.0 30.0   92.1

645  .3  23   8.0  2.0  -- --   --   --  -- --    --   --  -- --   -- -- -- --WQB1.00 30   --   --         1.30  53   8.0  2.0   63.3

646  .3   9   9.0   --  -- --   --   --  -- --    --   --  -- --   -- -- .10  3WQB1.00 28   --   --         1.35  40   9.0   --   49.2

650  .9  37    --  3.0  -- --   --   --  -- --    --   --  .07 2   .8 -- .05  2GLW -- -- 18.5   --
650                                                                  SHADOW BOAT                     7.8   1.02  41  19.3  3.0   70.0

651  .1   5   3.0  5.0  -- --   --   --  -- --    --   --  -- --   -- -- .25  8LRT1.00 41 20.0   --
651                                                                  SHADOW NWQL                     0.0   1.35  53  23.0  5.0   81.4
```

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PROCESSING FORMB FOR DIVISION AMD                        DATE RUN  85/05/23.

   ----ORGANIZATION---- --ENGINEERING---- -----MANTEC------ ---TECH OPS.--- --DM-- ------EXTERNAL---- SHADOW ----------TOTALS----------
 NO  PY SAL    OM   CAP  PY SAL   OM  CAP  PY SAL   OM  CAP  PY SAL   OM OT PY SAL AG PY SAL   OM  CAP COST    PY SAL    OM   CAP   COST
652   -- --    --    --  -- --   --   --  -- --   --   --  -- --   -- -- -- --    -- --   --   --   --    -- --    --    --     --
653  .8  33   7.0   7.0  -- --   --   --  -- --   --   --  -- --   -- -- -- --    -- --   --   --   --   .75  33   7.0   7.0   46.8
654  .3  12    --  30.0  -- --   --   --  -- --   --   --  -- --   -- -- .05  2GLM1.00 30 13.5   --        1.35  44  13.5  30.0   87.5
670 6.0 246 438.8    --  -- --   --   --  -- --   --   --  -- --   -- -- -- --    -- --   --   --   --  6.00 246 438.8    --  684.8

  29.00   725.0         .10      --      .30       --      .7C    7.0   .70      5.00   69.0      28.8      1448        304.5
      1216      300.0        3       --       10       --       21     4.     23      170      4.5      35.80      801.0        2582.0
```

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-600

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Analytical Methods Division Management and Administration | | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | ADMINISTRATION, METHODS DEVELOPMENT, QUALITY CONTROL, MANAGEMENT | | SECTION AMDDIV<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Lawrence, J. | TEL: 637-4319 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J. Burford | | |
| TIME FRAME/ CALENDRIER | START DEBUT 1980 | FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To ensure effective administration of the Analytical Methods Division and to provide leadership to the scientific program.

## Performance Indicators/Indicateurs de rendement

1. Coordinate preparation of study plans, quarterly progress reports; liaison with other federal, provincial, private agencies; and research grant reviews.
2. Prepare staff appraisal and promotion documents.
3. Convene section meetings and other impromptu meetings as required for program development, project monitoring and project evaluation.
4. Provide secretarial services to the Division.
5. Coordinate the approval and publication of scientific manuscripts and reports from the Division.

## Relevance/Objet

To promote efficiency, effectiveness and economy in the Division's projects and administration of A-Base and external funding under GLWQP, LRTAP, TCMP and PPWB.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-601

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Supercritical Fluid Chromatography: Applications to N-containing PAHs | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | METHODS DEVELOPMENT, TRACE ORGANICS, GC/HS CONTAMINANTS, POLYNUCLEAR AROMATIC HYDROCARBONS | SECTION ACRS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Onuska, F.I. TEL: 637-4635 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | K. Terry | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1984 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | B.K. Afghan, NWQL TEL: 637-4661 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To implement theoretical knowledge of dense gas chromatography for designing a supercritical fluid system operating with a flame ionization detector and to interface it with a mass spectrometer for analyzing aza - arenes.

Performance Indicators/Indicateurs de rendement

1. Testing and improving design of the SCF chromatography system during April 1985 - March 1986.
   a) Evaluation of flame ionization detector using various supercritical fluids. (Interim report by August 1985, final report by March 1986).
   b) Interface this system with a MS-detector (Interim report by August 1985, final report by March 1986).

Relevance/Objet

The above activities are essential to support the optimization of SCF chromatography with narrow-bore columns. SCF chromatography will allow the measurement of environmental contaminants which cannot be determined by gas or liquid chromatography such as thermally unstable or high molecular weight compounds. The technique will compliment methods currently used by the client (Water Quality National Laboratory) and enable a broader range of substances to be monitored.

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Study Plan
Plan d'étude

NO: 85-602

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|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Sample Introduction Systems for Atomic Spectroscopy and G.C. | | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | ANALYTICAL METHODS, TRACE METALS, CADMIUM, LEAD, ORGANICS, SAMPLING | | SECTION ACRS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Goulden, P.D. | TEL: 637-4658 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>GLWQP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | D.H.J. Anthony | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | | |
| PRIMARY USER/ USAGER PRIMAIRE | B.K. Afghan, NWQL | TEL: 637-4661 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Develop an ultrasonic nebulizer system for ICP and AAS allowing determination of trace metals at PPT levels (e.g. Cd at 5ppt).
2. Develop a chemical processing technique allowing determination of stable lead isotopes in sediments by ICP-MS.
3. Optimize a 'large-sample' extraction technique for organics for subsequent determination by G.C.

Performance Indicators/Indicateurs de rendement

1. A report and/or publication by December 1985 - technology transfer to WQB by March 1986.

2. A report and/or publication by October 1985.

3. A report and/or publication by October 1985 - working equipment to be installed in NWQL and Western Region Laboratories of WQB, March 1986.

Relevance/Objet

These works are being undertaken at the request of the client (Water Quality National Laboratory) to enable the laboratory to fulfill its obligation to the WQB monitoring program, toxic chemicals program and LRTAP programs. A need for Cadmium methodology was specifically identified in "Toxic chemical issues and research priorities" by GLWQP.

Part 2 of the study is being made at the direct request of AED, NWRI (Dr. J. Nriagu).

09/84

FORM A, PART 1/FORMULE A, PARTIE 1

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|---|---|---|---|
| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | Study Plan<br>Plan d'étude | | NO: 85- 603 |
| STUDY TITLE/ TITRE D'ETUDE | Electrochemistry and Flow Injection Analysis in Water | | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | ANALYTICAL METHODS, INSTRUMENTATION, WATER QUALITY, TRACE ELEMENTS | | SECTION ACRS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Sekerka, I. | TEL: 637-4657 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J.F. Lechner | | |
| TIME FRAME/ CALENDRIER | START DEBUT 1983 | FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | Dr. B.K. Afghan, NWQL | TEL: 637-4661 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To develop methods of water analysis employing "Flow Injection Analysis (FIA)".
2. To develop anodic and potentiometric stripping and ion scanning methods for trace metals analysis (cadmium, copper, lead).

Performance Indicators/Indicateurs de rendement

1a. A report and/or publication by March 1986 (determination of CN by FIA).

b. A report of the performance of the multiparameter (heavy metals) FIA system (spectrophotometry) by March 1986.

2. A report evaluating selected techniques for the determination of cadmium in water by August 1985.

Relevance/Objet

1. FIA is a new technique suitable for a large number of sample analyses. It has a great potential for routine analysis of water from economical as well as from technological aspects. NWQL has a great interest in the development of FIA methods.
2. Trace analysis for heavy metals (Cd, Cu, Pb) is of high priority as specified in GLWQP - toxic chemicals issues and priorities.

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Study Plan
Plan d'étude

NO: 85-604

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Methods for Toxaphenes, Phthalates and Sulfur Containing Compounds | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | ANALYTICAL METHODS, TOXAPHENE, PHTHALATE, SULFUR | SECTION ACRS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Scott, B.F. TEL: 637-4596 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J. Ryan | |
| TIME FRAME/ CALENDRIER | START DEBUT 1985 FINISH FIN 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | Dr. B.K. Afghan, NWQL TEL: 637-4661<br>Dr. D. Hallett, RDG/OR Office | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

A. To finalize the development of the method for ortho-phalate esters (water, sediment and fish).
B. To extend development method for Toxaphene to water and sediment samples.
C. To develop methods suitable for routine analysis of sulfur containing compounds in environmental samples.

Performance Indicators/Indicateurs de rendement

A.1 Clean-up - evaluation of GPC and Alumina columns August 1985.
A.2 Quantitation - comparison of GC/ECD and Normal Phase and Size Exclusion HPLC/UV detectors - October 1985.
A.3 Confirmation - Evaluation of Fluorometric Detection - November 1985.

Final Report by December 31/85.

B.1 Optimization of developed method for water samples - June 1985.
B.2 Optimization of the method for sediment samples - August 1985.
B.3 Validation of the procedures November 1985.

Final report by December 31/85.

C.1 Review and priorization of organosulfur compounds - January 1985.
C.2 Evaluation of existing techniques and establishment of detection limited - April 1985.
C.3 Development of separation and preconcentration procedures on synthetic, sediment and water samples - August 1985.

Relevance/Objet

A. The development of an analytical method for ortho-phthalate esters during 1982/3 was not finalized due to the organisation and priorities changes. Recently WQNL has requested the completion of this method assigning high priority to it.
B. During the past year a methodology for the analysis of toxaphene in fish tissue was developed. At the urgent request of WQNL, this method will be extended and modified to include water and sediment samples.
C. The need for an analytical methodology for sulfur containing heterocyclic hydrocarbons is identified as a priority in "Toxic Chemical Issues and Research Priorities"; the Great Lakes Water Quality Program, Sept. 1984, by the Interdepartmental Committee on Water. Also the proposed work is required by the WQNL. Sulphur containing heterocyclic compounds may be more carcinogenic than polycyclic aromatic hydrocarbons but their environmental occurrence has not been assessed because suitable methodology is not available.

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Study Plan
Plan d'étude

NO: 85- 605

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | General Maintenance and Technology Transfer | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | ANALYTICAL METHODS, TECHNOLOGY TRANSFER, ADMINISTRATION, STANDARDS | SECTION ACRS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Sekerka, I. TEL: 637-4657 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | P. Goulden, F. Onuska, B. Scott, J. Ryan, W. Wilkinson, J. Lechner, K. Terry | |
| TIME FRAME/ CALENDRIER | START DEBUT 1982 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | WQB - NWQL - GLWQP TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

### Goal/But

1. Transfer developed methods to clients for routine application.
2. Provide consultation, training and assistance in ACRS areas of expertise.
3. Provide specialized service (CHCL, GC-MS).
4. Maintain existing facilities.

### Performance Indicators/Indicateurs de rendement

Active participation at scientific meetings - review of scientific papers - consultation - publication - preparation of methods manuals, etc.

Developed methods suitable for routine application will be transferred to clients on an as needed basis.

Provide training to Water Quality National Laboratory staff and other as required.

### Relevance/Objet

This type of activity is required to satisfy IWD and DOE requirements as well as to promote, apply and maintain the work of ACRS.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude
NO: 85-610

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Determination of Nitrogen-Containing PAHs (Aza-arenes) | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | METHODS DEVELOPMENT, TRACE ORGANICS, GC/MS, CONTAMINANTS, POLYNUCLEAR AROMATIC HYDROCARBONS | SECTION ACRS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Onuska, F.I. TEL: 637-4635 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE GLWQP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | K. Terry | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | B.K. Afghan, NWQL TEL: 637-4661 | OTHER USERS/ AUTRES USAGERS 2 |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

### Goal/But

To develop the methodology for the determination and confirmation of aza-arenes and provide dioxin confirmatory analyses to WQNL.

### Performance Indicators/Indicateurs de rendement

Heterocyclic aromatic hydrocarbons, HAC, methodology will be tested on sediment samples from the Hamilton Harbour. It is known that steel mills and coking operations, including combustion of coke, represents sources of aza-arenes.

1. Collection of HAC-standards, April 1985 - March 1986.
2. Development of cleanup technique(s), April 1985 - September 1985.
3. Development of separation techniques, August 1985 - March 1986.
4. Reporting and documentation of data, March 1986 (finalized by March 1987).
5. Method optimization and transfer, March 1987.
6. Provide dioxin confirmatory analyses and full scan spectra to WQNL as required.

### Relevance/Objet

HAC's are well defined contaminants. They are introduced into the environment during combustion of fossil fuels. Very little is known of the fate and effect in the environment. However, it is known that they are involved in initiating carcinoma in mammals. These compounds have been identified as priority pollutants by the GLWQP.

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Study Plan
Plan d'étude

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|---|---|
| NO: | 85-611 |
| DIVISION | AMD |
| SECTION | ACRS |
| PAE<br>EAP | 4100 |
| STUDY TITLE/ TITRE D'ETUDE | Operation of Clean Hazardous Chem. Lab. and Separation of Trace Organics |
| KEY WORDS/ MOTS CLEFS | METHODS DEVELOPMENT, INSTRUMENTATION, TOXIC SUBSTANCES, ORGANICS |
| STUDY LEADER/ CHEF D'ETUDE | Sekerka, I. TEL: 637-4657 |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | R. Wilkinson |
| TIME FRAME/ CALENDRIER | START DEBUT 1983 FINISH FIN Ongoing |
| SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE | GLWQP |
| PRIMARY USER/ USAGER PRIMAIRE | B.K. Afghan, NWQL TEL: 637-4661 |
| OTHER USERS/ AUTRES USAGERS | |
| IWD/DGEI CONTACT | TEL: |
| INTEREST/INTERET DIRECT-GENERAL | |

Goal/But

1. To maintain inventory of hazardous compounds, prepare and provide standards of their compounds to Water Quality Board, Great Lakes Fisheries Research Branch, NWRI and others as required, manage waste disposal and provide full service of the CHCL.
2. To automate clean-up and separation of multiresidue procedure for trace organics (dioxins, furans).

Performance Indicators/Indicateurs de rendement

1. Standards of hazardous compounds will be validated and provided as required.
2. Interim report of the design by August 1985 and final report by March 1986.

Relevance/Objet

Manual procedures are time and space consuming, difficult to control, prone to human errors and with high safety risk. Partial or total automation would limit these problems.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 612

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|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Radioimmunoassay Technique for Dioxins | | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | ANALYTICAL METHODS, DIOXINS, METHODS DEVELOPMENT | | SECTION ACRS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Sherry, J.P. | TEL: 637-4313 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | R. Wilkinson | | |
| TIME FRAME/ CALENDRIER | START DEBUT 1983 | FINISH FIN March 1986 | GLWQA |
| PRIMARY USER/ USAGER PRIMAIRE | B.K. Afghan, NWQL | TEL: 637-4661 | OTHER USERS/ AUTRES USAGERS 5 |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. Calibration and standardization of the procedure and analysis of environmental samples in order to test the performance and applicability of the method.
2. Transfer interim methodology to NWQL.
3. Evaluate the specificity of the RIA for PCDDs.
4. Modify a previously developed clean up procedure for use with the RIA technique.

## Performance Indicators/Indicateurs de rendement

1. Performance report by January 1986.
2. Technology transfer by November 1985.
3-4. Status report by March 1986.

## Relevance/Objet

The evaluation of the RIA technique was initiated to satisfy an IWD requirement for a screening capability for dioxins with special reference to 2,3,7,8 - TCDD and other PCDD isomers.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

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|---|---|---|
| | | NO: 85-<br>621 |
| STUDY TITLE/<br>TITRE D'ETUDE | Media, Wash-up, Instrument and General Support | DIVISION<br>AMD |
| KEY WORDS/<br>MOTS CLEFS | BACTERIA, EQUIPMENT, MICROBIOLOGY, PUBLIC WORKS QUALITY CONTROL, WASTE MANAGEMENT | SECTION<br>MLS<br>PAE<br>EAP 1515 |
| STUDY LEADER/<br>CHEF D'ETUDE | McInnis, R. TEL: 637-4579 | SUPPLEMENTAL RESOURCES/<br>FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/<br>MEMBRES D'EQUIPE | A. Dutka | |
| TIME FRAME/<br>CALENDRIER | START DEBUT 1970 FINISH FIN Ongoing | |
| PRIMARY USER/<br>USAGER PRIMAIRE | TEL: | OTHER USERS/<br>AUTRES USAGERS<br>5 |
| IWD/DGEI<br>CONTACT | TEL: | INTEREST/INTERET<br>DIRECT-GENERAL |

## Goal/But

To provide as required, media and wash-up support to Microbiology Laboratory Section and other NWRI and CCIW units requiring this service.

## Performance Indicators/Indicateurs de rendement

1. Customer satisfaction and projects not being delayed by services required.
2. Semi-annual and annual statement to Section Head and clients.
3. To maintain common user equipment in good repair.
4. To maintain cultures of bacteria as stock.

## Relevance/Objet

This study provide essential support to all activities of MLS. Other Divisions of NWRI and several projects within the Department of Fisheries and Oceans are also supported by this study.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 622

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Microbial Studies of Great Lakes | DIVISION AMD |
| | | SECTION MLS |
| KEY WORDS/ MOTS CLEFS | BIOASSAY, ECOTOXICITY, SEDIMENTS, TOXICITY, LAKE ONTARIO, BACTERIA, MICROBIOLOGY | PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Dutka, B.J. TEL: 637-4286 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>GLWQA |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | K. Walsh, K. Kwan, D. Liu, K. Thompson | |
| TIME FRAME/ CALENDRIER | START DEBUT 1985 FINISH FIN 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | Great Lakes Toxic Chemicals Committee TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To obtain baseline data on toxicant, fecal sterol, coliphage and Legionella concentrations in inshore L. Ontario (Canada - U.S.), opposite river mouths and domestic industrial discharges and establish priority hazard index.

Performance Indicators/Indicateurs de rendement

1. To collect and process 40-50 water/sediment samples on one cruise on Lake Ontario, May-July 15.
2. Evaluate these samples for toxicant hazard (microbial screening tests - Kwan) health hazards (fecal sterol concentrations vs coliphage - Ecoli and Legionella) for June-July.
3. Final report on incidence of toxicant hazards and bacterial hazards with priority site hazard scheme based on test results by March 1986.

Relevance/Objet

1. Great Lakes Water Quality Programme Toxic Chemicals Issues and Research Priorities 1985-86: Page 62 - Problem, Page 64 - Milestone 4 and page 79 Method Development #4.

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Study Plan
Plan d'étude

NO: 85- 623

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Microbial Toxicity Screening Methods, Evaluation and Testing | DIVISION AMD |
| | | SECTION MLS |
| KEY WORDS/ MOTS CLEFS | BACTERIA, BIOASSAY, TOXICITY, METHODS DEVELOPMENT, MICROBIOLOGY | PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | B.J. Dutka TEL: 637-4579 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | X. Hao (Acadamia Simica China) | |
| TIME FRAME/ CALENDRIER | START DEBUT 1985 FINISH FIN 1987 | |
| PRIMARY USER/ USAGER PRIMAIRE | T. Dafoe, WQB-HQ TEL: 997-3422 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Complete studies on microbial electrode technique to screen for aquatic toxicants and evaluate against Microbiology Laboratories Section (MLS) routine toxic screening techniques such as Microtox, Spinillum volutans, Pseudononas aenuginusa density.
2. Evaluate the potential of ATP and S.O.S. chromotest kit for toxicant screening.
3. Evaluate the three procedures against MLS toxicant screening procedures and natural samples.
4. Evaluate toxicity screening procedures using various elution and preservation methods.

Performance Indicators/Indicateurs de rendement

1. Screen single and mixed bacteria for ATP tests by October 1985.
2. Complete pure chemical studies on selected ATP procedures by February 1986.
3. Report on microbial electrode system by March 1986.
4. Obtain literature and supplies for S.O.S. chromotest kit by February 1986.

Relevance/Objet

1. Bacterial screening tests for toxicants are gaining international recognition as a means of economically and efficiently screening water and effluents: The WQ monitoring programme of IWD is becoming more involved with biological parameters and this study is designed to assist the WQB personnel in this endeavour by evaluating various toxicity screening procedures and preservation techniques.
2. The Great Lakes Water Quality Programme, Toxic Chemicals Issues and Research Priorities 1985-86: Page 62 - Problem, Page 64 - Milestone 4 and page 79 - Method Development #4.

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Study Plan
Plan d'étude

NO: 85- 674

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Bacterial Toxicity Screening Symposium | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | BACTERIA, BIOASSAY, ECOTOXICITY, INTERNATIONAL RELATIONS, WORKSHOP | SECTION MLS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Dutka, B.J. TEL: 637-4286 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | D.L. Liu (ECD) | |
| TIME FRAME/ CALENDRIER | START DEBUT 1982 FINISH FIN 1989 | |
| PRIMARY USER/ USAGER PRIMAIRE | T. Dafoe, HQ, IWD TEL: 997-3422 | OTHER USERS/ AUTRES USAGERS 3 |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. Hold Second International Symposium on Toxicity Testing Using Bacteria on May 6-10, 1985 in Banff, Alberta.
2. Prepare brochure - Call for Papers for Third International Symposium on Toxicity Testing - May 11-15, 1987, Metz, France and have brochure distributed by Symposium Sponsor - Centre des Sciences de l'Environnement, U. of Metz, France.
3. Find sponsor for the 4th International Symposium on Toxicity Testing, May 8-12, 1989 in Boulder, Colorado.

## Performance Indicators/Indicateurs de rendement

1. Holding of International Symposium on May 6-10, 1985 by May 1985.
2. Draft of brochure announcing Third International Symposium on Toxicity Testing by December 15, 1985.
3. Confirm sponsorship of Third International Symposium on Toxicity Testing by September 15, 1985.
4. Confirm sponsor of Fourth International Symposium on Toxicity Testing by March 31, 1986.

## Relevance/Objet

Bacterial screening tests for toxicants are gaining international recognition as a means of economically and efficiently screening water and effluents. Recent reports from U.S.A. toxicologists indicate that body contact with polluted waters is as hazardous as drinking the water, therefore the only practical way to screen all potential toxicant hazard sources is by bacterial screening tests. Also note in: The Great Lakes Water Quality Program, Toxic Chemicals Issues and Research Priorities 1985-86: Page 62 - Problem, Page 64 - Milestone 4 and Page 79 - Method Development #4.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 625

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Microbial and Toxicant Screening Support to IWD and NWRI Studies | | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | BACTERIA, BIOMASS, WATER QUALITY, TOXICITY, SEDIMENTS | | SECTION MLS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Kwan, K.K. | TEL: 637-4579 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | B.J. Dutka, K. Walsh | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 | FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | H. Sloterdijk, IWD-QR | TEL: 283-3916 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To provide toxicant screening, elution data and microbial biomass on sediment and water from Lac Des Deux Montagnes.
2. To evaluate the microbiological densities and toxic effects of Ottawa R. samples collected at Lemieux Island.
3. To participate in Lake Ontario inshore for toxicity estimations (85-622).

Performance Indicators/Indicateurs de rendement

1. Set up sampling programme for Lac Des Deux Montagnes with H. Sloterdijk by May 1985.
2. Perform analysis on and prepare report on water and sediment samples submitted for biomass and toxicant screening tests for Lac Des Deux Montagnes by March 1986.
3. Process weekly water samples from Ottawa R. for coliphage (K. Walsh), E. coli (K. Walsh) - Toxicity effects by April-December 1985.
4. Prepare report on Ottawa R. data by February 1986.
5. Prepare data summary report of L. Ontario inshore toxic effects by February 1986.

Relevance/Objet

1. Support has been requested by IWD Quebec Region for Lac Des Deux Montagnes under scope of the National Water Quality Network Programme.
2. Ottawa R. support is designed to assist WQB personnel in selecting key biological parameters applicable to their water quality monitoring programme.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 626

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Microbial Response to Loadings | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | BACTERIA, TOXIC SUBSTANCES, SEDIMENTS, LAKE MICROSCOPY | SECTION MLS<br>PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Rao, S.S. TEL: 637-4312 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | S.S. Rao, A.A. Jurkovic, K. Walsh, K. Kwan | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN May-June 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | H. Sloterdijk, IWD-QR TEL: 283-3916<br>R. Stevens, IWD - OR 637-4641 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To study the effects of Toxic Substances on microbiota in sediments of Lac Des Deux Montagnes (IWD - Quebec Region).
2. To define temporal and spatial distributions of microbial biomass in Lake Ontario and to develop a "Bioindex Parameter" for Surveillance (Lake Ontario Task Force).

## Performance Indicators/Indicateurs de rendement

1. Approximately 75 sediment/water samples submitted by the IWD Quebec Region will be processed for total and respiring and nitrogen and sulfur cycle bacteria. Few selected sediment samples will be evaluated for sediment microbial activity.
   a) Sampling and processing by September-October, 1985.
   b) Data Summary Report/paper by March-April, 1986.
2. Perform analysis and collate data from 22 weekly samples at 2 (two) Lake Ontario Stations and 3 (three) Surveillance cruises by March - April 1986.

## Relevance/Objet

This study is requested by the IWD, Quebec Region and IWD, Ontario Region and falls within the scope of National Water Quality Network program.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-627

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Organic Matter Biodegradation in Lake Sediments - Effect of Acid Stress | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | BACTERIA, ORGANIC MATTER, BIODEGRADATION, SEDIMENTS, LAKE ACIDIFICATION, IMPACT, TECHNOLOGY TRANSFER | SECTION MLS<br>PAE EAP 4200 |
| STUDY LEADER/ CHEF D'ETUDE | Rao, S.S. TEL: 637-4312 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | S.S. Rao, A.A. Jurkovic (AMD), J.O. Nriagu, G.G. Leppard, D. Urciuoli, B.K. Burnison (AED) | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN December 1986 | LRTAP |
| PRIMARY USER/ USAGER PRIMAIRE | F.C. Elder, LRTAP TEL: 637-4212 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To assess the effects of acidification on accumulation or biodegradation of organic matter in soft lake water sediments.

Performance Indicators/Indicateurs de rendement

I Field Work: Obtain representative Lake Sediment Samples from a) Lake with low productivity and low sulfur concentrations (e.g. Turkey Lakes Area), b) productive lake with high sulfur input (Sudbury Area Lakes).

1. Sampling: Start May-June 1985, Completion Oct.-Nov. 1985.
2. Carbon-Nitrogen analysis completion and establish C/N ratios (J.O.N.) Dec. '85 to Jan. '86.

II Laboratory Studies: Set up an experimental microcosm to study the effects of a) sulfate enrichment, b) other nutrient additions and c) pH reductions on the biodegradation of organic matter.

1. Setting up of Experimental Chamber June-July '85 (S.S.R).
2. Sampling and analysis completion Dec. '85-Jan. '86 (S.S.R., J.O.N., G.G.L., B.K.B.).
3. Data analysis completion Feb.-March '86.
4. Preliminary Summary Report March-April '86.

5/6. Final Report describing the microcosm to relate microbial phenonmenon to both the experimental manipulations and the end results May-June '86 (S.S.R., J.O.N., G.G.L.).

7. Sediment respiration using $^{14}C$ org. to compare with $CO_2$ respiration (B.K.B.) Dec. '85. Report Jan-Feb/86 (B.K.B.).
8. Paper/jointly - Nov.-Dec. 1986.

Relevance/Objet

There are conflicting reports on the effects of acidification on the organic matter accumulation in lake sediments. The degradation of sedimentary organic matter contributes alkalinity and nutrients to overlying waters. The study of the effects of pH, $SO_4$ and $NO_3$ inputs on organic matter degradation therefore is fundamental to the understanding of the response of any lake to acid rain. This is a joint AMD-AED project.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 642

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Organic Methods Development | DIVISION AMD<br>SECTION QAMS |
| KEY WORDS/ MOTS CLEFS | TOXIC ORGANICS, METHODS DEVELOPMENT, TOXIC SUBSTANCES, PESTICIDES | PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Stokker, Y.D. TEL: 637-4653 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | H.B. Lee | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | B.K. Afghan, NWQL TEL: 637-4661 | OTHER USERS/ AUTRES USAGERS 6 |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

1. To develop a multi-class, multi-residue method for the analyses of OCs, PCBs, CBs and neutral herbicides in water and in sediments.
2. To develop and validate a method for pentachlorophenol in sediment at low ppb levels and another one for nitro and alkyl phenols in water.

## Performance Indicators/Indicateurs de rendement

1. Development of a multi-class, multi-residue method:
   (a) evaluate co-extraction, cleanup and sample applicability to natural waters (July) and different sediments (October).
   (b) submit report to client with single operator statement on precision, accuracy and detection limit at 2-3 concentration levels (November).
2. Method development for pentachlorophenol in sediment:
   (a) evaluate extraction and cleanup procedures and validate the method for different sediments (January 1986).
   (b) submit report to client with single operator statement on precision, accuracy and detection limit at 2-3 concentration levels (February 1986).
3. Development and validation of a method for the analysis of nitro and alkyl phenols in water (August) and write a report (September).

## Relevance/Objet

There is a need to increase the number of organic compounds analyzed in a single sample in order to reduce the quantity and expense of bulk sample handling (collection, preservation, storage, shipping, etc.).

09/84

FORM A, PART 1/FORMULE A, PARTIE 1

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 643

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | WQB and PPWB Quality Assurance Program | | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | INTERLABORATORY STUDIES, DATA QUALITY, ANALYTICAL METHODS, STANDARD REFERENCE MATERIALS, STATISTICAL GRAPHS | | SECTION QAMS<br>PAE EAP 1312 |
| STUDY LEADER/ CHEF D'ETUDE | Alkema, H. | TEL: 637-4654 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | A.S.Y. Chau | | |
| TIME FRAME/ CALENDRIER | START DEBUT Sept. '82 FINISH FIN Ongoing | | |
| PRIMARY USER/ USAGER PRIMAIRE | M. Forbes, WQB, NWQL | TEL: 637-4577 | OTHER USERS/ AUTRES USAGERS 7 |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

To ensure that data generated by WQB laboratories and PPWB laboratories is of good and comparable quality.

## Performance Indicators/Indicateurs de rendement

1. Prepare and check test samples (reference materials) (ongoing).
2. Distribute bimonthly test samples for approximately 40 inorganic parameters to 5 WQB and 3 PPWB labs.
3. Evaluate data and generate a report, one every two months for both WQB and PPWB.
4. Tabulate yearly pertinent data and generate statistical graphs for precision, accuracy and methods precision for PPWB for each of the 40 parameters (March 1986).
5. Prepare 2 reference waters to be used for data generation for major ions (February 1986).
6. Update computer programs to fulfil the requirements of the various labs (as required).

## Relevance/Objet

Requested by WQB/Headquarters and PPWB to ensure reliability and compatibility of the data generated by WQB laboratories and the Prairie Provinces Water Board laboratories (Interregional, IWD/NWQL and PPWB).

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 644

| | |
|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Certified Reference Materials, Preservation, and National Q.C. Study |
| KEY WORDS/ MOTS CLEFS | QUALITY CONTROL, TRACE METALS, LRTAP, INTER-LABORATORY STUDIES, STANDARD REFERENCE MATERIALS, ANALYTICAL METHODS |
| STUDY LEADER/ CHEF D'ETUDE | Cheam, V. TEL: 637-4645 |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | A.S.Y. Chau |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN December 1986 |
| PRIMARY USER/ USAGER PRIMAIRE | M. Forbes TEL: 637-4577 |
| IWD/DGEI CONTACT | TEL: |

DIVISION AMD

SECTION QAMS

PAE EAP 1312

SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE

OTHER USERS/ AUTRES USAGERS 8

INTEREST/INTERET DIRECT-GENERAL

## Goal/But

To concentrate on a case preservation study where the "true time zero" can be established, to certify a coloured water CRM, and to carry out a National Q. C. study on trace metals in sediments.

## Performance Indicators/Indicateurs de rendement

1. CRM certification (Final phase).
    (a) Generation of certified values (July 1985).
    (b) Data Evaluation and report writing (December 1985).
2. Preservation
    (a) Investigate a case study for some selected ions (September 1985).
    (b) Investigate a case study for some selected metals (March 1986).
3. National Q.C. study (Trace metal in sediments).
    (a) Send out questionnaire and interpret returned questionnaires (March 1986).
    (b) Study design and sample distribution (July 1986).
    (c) Evaluate data and write report (December 1986).

## Relevance/Objet

A case preservation study is needed so that the "true time zero" may be established and the monitoring reflects the real situation; a coloured water CRM is essential for generation of accurate $SO_4$ data; and a Q.C. study assesses WQB data against other agencies.

09/84

FORM A, PART 1/FORMULE A, PARTIE 1

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 645

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Federal/Provincial Quality Assurance Program | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | QUALITY CONTROL, DATA QUALITY | SECTION QAMS<br>PAE EAP 1312 |
| STUDY LEADER/ CHEF D'ETUDE | Chau, A.S.Y. TEL: 637-4653 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Term PC (to be filled) | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | Water Quality Branch TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To develop a specific quality assurance program to ensure compatibility and reliability of data generated by provincial and federal laboratories under the terms of reference of the Federal/Provincial Data Quality Agreements.

Performance Indicators/Indicateurs de rendement

1. Development of short and long term quality assurance plan specific to this program (May 1985).
2. Train term personnel in quality assurance (3 months).
3. Set up computer programming for data evaluation (Sept. 1985) and update or modify statistical techniques (ongoing).
4. Initiate a first QA study for inorganics in water (Dec. 1985).

Relevance/Objet

Federal/Provincial agreements on water quality monitoring.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-646

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Preservation of Organics | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | PRESERVATION, TOXIC ORGANICS, PCB'S, CHLOROPHENOLS, HERBICIDES | SECTION QAMS<br>PAE EAP 1312 |
| STUDY LEADER/ CHEF D'ETUDE | Lee, H.B. TEL: 637-4645 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | A.S.Y. Chau, N. Arafat | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | B.K. Afghan, WQNL TEL: 637-4661 | OTHER USERS/ AUTRES USAGERS 1 |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To evaluate preservation techniques for organics such as PCB's, chlorophenols and neutral herbicides in natural water.

Performance Indicators/Indicateurs de rendement

1. Preservation of PCB's in water:
   (a) Preliminary training on PCB analysis (April 15).
   (b) Prepare test samples using 5 regional waters (April 5).
   (c) Monitor stability of PCB's according to schedule for up to 15 weeks and tabulate data (July 30).
2. Preservation of phenols in water:
   (a) Preliminary training on phenol analysis (June 30).
   (b) Prepare test samples using 3 regional waters, monitor stability for up to 15 weeks and tabulate data (September 30).
3. Preservation of neutral herbicides in water:
   (a) Preliminary training on herbicide analysis (September 15).
   (b) Prepare test samples using 5 regional waters, monitor stability for up to 15 weeks and tabulate data (February 1986).
4. Data evaluation and report (March 1986).

Relevance/Objet

Due to lab centralization, WQB Headquarters requested preservation studies of all organic parameters routinely analyzed by WQNL.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 650

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | IJC Quality Control (Interlab Studies) | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | IJC, GREAT LAKES, QUALITY CONTROL, SURVEILLANCE, DATA QUALITY | SECTION QAMS<br>PAE EAP 1312 |
| STUDY LEADER/ CHEF D'ETUDE | Aspila, K.I. TEL: 637-4638 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>GLWQA |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT Oct. 1977 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | T. Wagner TEL: 637-4531 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

Provide three interlaboratory quality control comparison studies to laboratories in the Great Lakes basin that support the IJC.

## Performance Indicators/Indicateurs de rendement

1. Obtain from agencies, that support the IJC, various fish and sediment reference materials (April through Aug. '85).
2. Analyze through contracts the constituent content of the reference fish and sediments (May through Nov '85).
3. Prepare and distribute interlaboratory comparison study (Study 54: organic in fish - Jan '86 to July '86).
4. Prepare and distribute interlab Study 51 (Total phosphorus in water) - (May through Sept '85).
5. Perform duties as Chairman of the Data Quality Work Group and member of the Surveillance Work Group.

## Relevance/Objet

This project supports the IJC Data Quality Work Group, the Surveillance Work Group and other institutions of the IJC, Great Lakes Water Quality Agreement.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-651

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | LRTAP Interlaboratory Quality Control Studies | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | LRTAP, QUALITY CONTROL, NUTRIENTS, DATA QUALITY | SECTION QAMS<br>PAE EAP 4200 |
| STUDY LEADER/ CHEF D'ETUDE | Aspila, K.I. TEL: 637-4638 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>LRTAP |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | S. Todd, A.S.Y. Chau | |
| TIME FRAME/ CALENDRIER | START DEBUT Oct. 1982 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | F.C. Elder, LRTAP TEL: 637-4212 | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

Define and improve the quality of data generated by laboratories that provide data to the federal-provincial LRTAP program.

## Performance Indicators/Indicateurs de rendement

1. Generate reference material for major ions and nutrients in water to suit the needs of the LRTAP participants (ongoing).
2. Sample preparation, verification and distribution of 3 interlab studies for major ions and nutrients to 30-50 labs. (L9, L10, L11) (one study per 4 months)
3. Data evaluation and interpretation (ongoing).
4. Prepare final reports for each study (one report every 4 months).
5. Investigate and ensure sample homogenity and stability (compile monthly data).
6. Refinement to our present computer programs for data evaluation (ongoing).
7. Maintain liaison with the analysts, managers, data users and the LRTAP subgroup.

## Relevance/Objet

This study is in response to the quality assurance needs, as identified by the LRTAP quality assurance subgroup of the Federal-Provinical Research Monitoring and Co-ordinating Committee (RMCC).

**NATIONAL WATER RESEARCH INSTITUTE**
**L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX**

**Study Plan**
**Plan d'étude**

**NO: 85-** 652

| | | |
|---|---|---|
| **STUDY TITLE/ TITRE D'ETUDE** | Quality Assurance Program - Dredging | **DIVISION** AMD |
| **KEY WORDS/ MOTS CLEFS** | QUALITY CONTROL, DREDGING, IJC, GREAT LAKES, WATER, SEDIMENTS, TRACE METALS, ORGANICS | **SECTION** QAMS<br>**PAE EAP** 4100 |
| **STUDY LEADER/ CHEF D'ETUDE** | Lee, H.B. **TEL:** 637-4645 | **SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE**<br>GLWQP |
| **TEAM MEMBERS/ MEMBRES D'EQUIPE** | A.S.Y. Chau, G. Dookran (GLWQP term PY) | |
| **TIME FRAME/ CALENDRIER** | **START DEBUT** April 1985 **FINISH FIN** March 1986 | |
| **PRIMARY USER/ USAGER PRIMAIRE** | I. Orchard (EPS - OR) **TEL:** 966-5840 | **OTHER USERS/ AUTRES USAGERS**<br>2 |
| **IWD/DGEI CONTACT** | **TEL:** | **INTEREST/INTERET**<br>DIRECT-GENERAL |

## Goal/But

1. To critically assess the quality of data obtained through interlaboratory analysis of water and sediment samples related to dredging.
2. Develop and prepare suitable sediment reference materials and samples required for the above QA studies.

## Performance Indicators/Indicateurs de rendement

1. Design and conduct a QA study on trace metal analysis in sediments (July) and write a report (Sept).
2. Design and conduct a QA study on organics (Jan) and write a report (March '86).
3. Continue the development of reference materials for PCBs and trace metals (March '86).

## Relevance/Objet

Through support of this proposal, Canada can meet its commitment made in Annex II of the GLWQA to undertake surveillance and monitoring programs as well as provide support to work being undertaken under GLWQA Article VI (g) to introduce measure to abate and control pollution from Great Lakes dredging activities.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 653

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Quality Assurance Program and CRM Development for Organics | DIVISION AMD<br>SECTION QAMS |
| KEY WORDS/ MOTS CLEFS | QUALITY CONTROL, STANDARD REFERENCE MATERIALS, TOXIC ORGANICS | PAE EAP 4100 |
| STUDY LEADER/ CHEF D'ETUDE | Lee, H.B. TEL: 637-4645 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | A.S.Y. Chau | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | M.A. Forbes, WQB TEL: 637-4577 | OTHER USERS/ AUTRES USAGERS 6 |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Finalize the development of CRMs chlorobenzenes and PAHs by in-house GC-MS analyses.
2. Conduct a QA program for the analysis of organic parameters in herring gull eggs.

Performance Indicators/Indicateurs de rendement

1. Set up and conduct internal and external QA/QC for Herring Gull Surveillance Project:
   - (a) Establish protocols with contract and WQN Laboratories (May 1985).
   - (b) Prepare at least 2 control samples of large quantity of chicked eggs (July 1985).
   - (c) Establish preliminary reference values of control samples (October 1985) and monitor stability.
   - (d) Monitor contract laboratory performance as required.
2. CRM development:
   - (a) Evaluate a mass selective detector for routine quantitative analyses of chlorobenzenes and PAHs (August 1985).
   - (b) Set up in-house GC-MS analysis of chlorobenzenes and PAHs if time permits (March 1986).
   - (c) Prepare report (May 1986).
2. Quality control studies:
   - (a) Write a report for a national QA study initiated in 84/85 (Sept).
   - (b) Initiate a QA study for sediment PAH analysis (March '86).

Relevance/Objet

There is an urgent demand to increase the number of organic parameters included in QC programs. The development and certification of CRMs are required for method evaluation and implementation of in-house and interlaboratory QC activities.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 654

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Quality Assurance Program - UGLCCS | | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | QUALITY CONTROL, DATA QUALITY | | SECTION QAMS<br>PAE EAP 1312 |
| STUDY LEADER/ CHEF D'ETUDE | Chau, A.S.Y. | TEL: 637-4653 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>GLWQA |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Term PC (proposed) | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | | |
| PRIMARY USER/ USAGER PRIMAIRE | UGLCCS - Management Committee | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

To serve as a Co-Chairman of a Quality Management Work Group (QMWG) for UGLCCS and to plan, develop and coordinate all activities relating to quality assurance.

Performance Indicators/Indicateurs de rendement

1. Fill term position (June/July '85).
2. Train term person (ongoing).
3. Consolidate, from QMWG members, inputs of review of QA Work Project Plans of other work groups (May/August '85 or within 2 months of receipt of work plans).
4. Contact each work group chairman or QA liaison person to resolve QA issues on these work plans (June/September '85).
5. Report recommendations and findings to UCC Binational Committee (ongoing).
6. Arrange and chair Quality Management Work Group meetings (ongoing).

Relevance/Objet

Under the auspices of the UCC Binational Program, the Data Quality Work Group will ensure that the data are valid and consistent with the objectives of the program.

09/84

FORM A, PART 1/FORMULE A, PARTIE 1

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85- 670

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Computer Services for Water Management Research | | DIVISION AMD |
| KEY WORDS/ MOTS CLEFS | COMPUTER, EDP, CONSULTATION | | SECTION CSS<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Pulley, H.C. | TEL: 637-4209 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | M. Kinder, U. Hamilton, B. Malseed, P. Moody, J. Foley | | |
| TIME FRAME/ CALENDRIER | START DEBUT | FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | All components of CCIW | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

## Goal/But

Provide centralized computing, plotting, and data entry services to all components of the Canada Centre for Inland Waters and external users approved by the Director, NWRI.

## Performance Indicators/Indicateurs de rendement

1. Complete the procurement and installation of a new central computer system in a timely manner (time frame dependent on decisions made by Treasury Board and DSS, i.e. open or directed tender). Provisional target date: July 1985.
2. Manage the installation effectively to provide a minimum monthly up-time for all systems of a least 95%.
3. Provide operating system support by:
   (a) analyzing system software malfunctions within two days, report to vendor within one week, fix within two weeks if local fix possible.
   (b) Installing new system software releases within two week if feasible and desirable (dependent on stability of new release).

## Relevance/Objet

This is an ongoing support service required by most areas of activity at CCIW.

# TECHNICAL OPERATIONS DIVISION

## Technical Operations Division

The Technical Operations Division provides a wide variety of technical support to the field research studies of NWRI, its regions and, where possible, to other departments, agencies and universities.

Areas of responsibility include field measurement, sample collection and some basic analyses of physical, chemical, biological parameters and sediments from freshwater systems aboard major research ships, launches, shore-based field parties and diving operations. The Division is also responsible for the preparation, modification, field use and maintenance of a wide variety of mechanical, electronic and hydraulic sampling and data acquisition systems.

The Division arranges for the acquisition and scheduling of major research ships, launches and land sites; the co-ordination of all NWRI field research studies to ensure effective and efficient use of technical staff, vehicles and equipment. The Division also ensures a high level of safety for all field operations.

## STUDIES FOR TECHNICAL OPERATIONS DIVISION

| SECTION | STUDY | STUDY TITLE | STUDY LEADER | 85/05/31. |
|---|---|---|---|---|
| DIVISION | | | | |
| | 801 | TECHNICAL OPERATIONS DIVISION MANAGEMENT AND ADMINISTRATION | MACDONALD,H.B. | |
| | 805 | SUPPORT TO EXTERNAL AGENCIES | MACDONALD,H.B. | |
| SHIP SURVEY | | | | |
| | 803 | OPEN LAKE SURVEILLANCE SUPPORT | HEALEY,P.M. | |
| FIELD SURVEY | | | | |
| | 802 | LOGISTIC SUPPORT TO NWRI, FIELD EQUIPMENT AND VEHICLES | TAYLOR,W.B. | |
| | 804 | COMMON-USER EQUIPMENT MAINTENANCE AND ACQUISITION | TAYLOR,W.B. | |
| | 807 | UNDERWATER OPERATIONS AND REMOTE AREAS WORKING GROUP | TAYLOR,W.B. | |
| LIMNOLOGICAL INSTRUMENT | | | | |
| | 806 | LIMNOLOGICAL/METEOROLOGICAL INSTRUMENTATION SUPPORT | DIAZ,J.A. | |

```
                                                                     DATE RUN  85/05/23.
PROCESSING FORMB FOR DIVISION TCD

   ----ORGANIZATION---- --ENGINEERING---- -----MANTEC------ ---TECH OPS.--- --DM-- ------EXTERNAL---- SHADOW ----------TOTALS-----------
 NO  PY SAL    OM    CAP  PY SAL   OM   CAP  PY SAL   OM   CAP  PY SAL   OM OT PY SAL AG PY SAL   OM   CAP COST     PY SAL    OM    CAP   COST

801 2.0  68  40.0     --   -- --   --   --   -- --   --   --   -- --   -- --  -- --      -- --   --    --    --   2.00  68  40.0     --  108.0

802 1.4  45  75.0   48.0   -- --   --   --   -- --   --   --   -- --   -- 10 .05  2      -- --   --    --    --   1.45  56  75.0   48.0  179.5

803 5.3 170  64.5   20.0   -- --   --   --  .10  3   --   --   -- --   -- 70  -- --      -- --   --    --
803                                                                      SHADOW BLMSS         SHIPS 1158.0   5.40 243  64.5   20.0 1485.4

804  .4  13  17.0   90.0   -- --   --   --  .10  3   --   --   -- --   -- --  -- --      -- --   --    --    --    .50  16  17.0   90.0  123.2

805 1.1  35  25.1     --   -- --   --   --   -- --   --   --   -- --   -- 15  -- --      -- --   --    --
805                                                                      SHADOW BLMSS         SHIPS   33.0   1.12  45  25.1     --  103.5

806 3.0 112  58.0   26.0   -- --   --   --  .30 10   --   --   -- --   --  5 .15  5      -- --   --    --    --   3.45 132  58.0   26.0  216.2

807  .3  10   7.5   45.0   -- --   --   --  .10  3   --   --   -- --   -- --  -- --      -- --   --    --    --    .40  13   7.5   45.0   65.5


   13.52    287.1          --        --      .60     --        --       --    .20          --        --    1191.0       574         229.0
        452         229.0     --        --      20       --       --      94.     7          --         --     14.32      287.1          2281.2
```

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-801

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Technical Operations Division Management and Administration | DIVISION TOD |
| | | SECTION TODDIV |
| KEY WORDS/ MOTS CLEFS | PLAN, ADMINISTRATION, MANAGEMENT, FIELD SUPPORT | PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Macdonald, H.B. TEL: 637-4217 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | S.R. Mitchell | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1966 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To provide planning, direction and control of technical support to scientific studies.
2. To provide efficient administration of departmental regulations and to ensure complete and accurate records.
3. To provide full secretarial support to Division Chief and his technical staff of 26 members.
4. Provide direction in the writing and compositon of the NWRI "Instructional Manual for Limnological Observations".

Performance Indicators/Indicateurs de rendement

1. Provision of ongoing direction for technical and logistic support to scientific programs.
2. Allocate funds and approve expenditures within authority.
3. Provide ongoing office management and record-keeping. Type all cruise plans and reports in a timely fashion.
4. Complete the second draft outline of the manual for NWRI Management by fiscal year-end.

Relevance/Objet

To ensure high quality support to NWRI scientific studies is maintained and that funds are expended efficiently and in conformity with Departmental regulations.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-802

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Logistic Support to NWRI, Field Equipment and Vehicles | DIVISION TOD |
| KEY WORDS/ MOTS CLEFS | EQUIPMENT, FIELD SUPPORT | SECTION FIELD<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Taylor, W.B. TEL: 637-4216 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | W.D. Hunt, L.J. Lomas, G.M. Perigo | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1966 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | NWRI Study Leaders TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To provide a Rigging Shop, Warehousing and Field Equipment Stores in support of NWRI studies.
2. To provide a common vehicle pool in support of all scientific, operational and administrative activities conducted away from NWRI.

Performance Indicators/Indicateurs de rendement

1. (a) Produce detailed listing of field equipment for issue, updated at 6-month intervals.
   (b) Maintain records of Field Stores issues.
   (c) Maintain a rigging shop facility for preparation, repair and maintenance of common-user field equipment.

2. (a) Maintain vehicle assignment and maintenance schedules.
   (b) Produce monthly logs and FMIS reports to Ottawa.
   (c) Requisition required replacement vehicles for 86/87.
   (d) Maintain regional standing offers for vehicle repairs.

Relevance/Objet

To control, maintain and schedule a fleet of vehicles and repair and maintain common-user field equipment for use on all off-site research activities of NWRI and like research of external agencies, negating duplication of resources in this area, thus reducing government spending.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-803

| | |
|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Open Lake Surveillance Support |
| KEY WORDS/ MOTS CLEFS | SURVEILLANCE, IJC, WATER QUALITY, BIOINDEX MONITORING, LAKE SUPERIOR, CANADIAN WILDLIFE SERVICE, LAKE ONTARIO, LAKE HURON |
| STUDY LEADER/ CHEF D'ETUDE | Healey, P.M. TEL: 637-4715 |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Various Technical Operations Division Staff |
| TIME FRAME/ CALENDRIER | START DEBUT April 1974 FINISH FIN Ongoing |
| PRIMARY USER/ USAGER PRIMAIRE | IWD Ontario Region TEL: |
| IWD/DGEI CONTACT | F.J. Philbert TEL: 637-4663 |

| | |
|---|---|
| DIVISION | TOD |
| SECTION | SHIP/S |
| PAE EAP | 1113 |
| SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE | |
| OTHER USERS/ AUTRES USAGERS | 2 |
| INTEREST/INTERET | DIRECT-GENERAL |

## Goal/But

To provide the expertise and support to carry out the Surveillance Program (GLISP) and Biological Index Monitoring Study in support of IWD-OR, CWS and GLFRB by:

1. Logistics management and co-ordination of these programs and provision of technical support, expertise and equipment.
2. Writing of cruise plans and reports for individual cruises and writing preliminary descriptive reports.
3. Logistics input to the Surveillance Working Committee.
4. Providing technical and logistic support to CWS and GLFRB, PFF/DFO.

## Performance Indicators/Indicateurs de rendement

1. Scheduling of requested vessel, equipment and technical support in the required time frames.
2. Successful commencement and completion of the requested shipboard and field studies with the necessary documentation (cruise plans, cruise reports or work plans) in the scheduled times and within allocated resources.
3. Immediate availability of historic and present information on methodology of sampling, duration of time required for completion of cruises on individual lakes, costs of cruises, etc., for the Surveillance Program.
4. Availability of vessel and/or launch support in the requested time frame, plus the availability of technical support and equipment to conduct these studies within the resources allocated.

## Relevance/Objet

To provide technical support to furnish a continuing report on long-term information of water quality and eutrophication parameters in the Great Lakes. To supply technical support and expertise to provide input required for the Surveillance Program under the Canada/U.S. Agreement and the Water Quality Board Annual Report to the International Joint Commission.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-804

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Common-User Equipment Maintenance and Acquisition | DIVISION TOD |
| KEY WORDS/ MOTS CLEFS | EQUIPMENT, FIELD SUPPORT, PACIFIC & YUKON REGION, WESTERN & NORTHERN REGION, QUEBEC & ATLANTIC REGIONS, ONTARIO REGION | SECTION FIELD<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Taylor, W.B. TEL: 637-4216 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | M.R. Mawhinney, J.A. Diaz, P.M. Healey | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1966 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | NWRI Study Leaders TEL: | OTHER USERS/ AUTRES USAGERS 5 |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Update the inventory for capital equipment under TOD responsibility.
2. Upgrade, replace or dispose of lost, damaged or worn-out equipment.
3. Maintain all equipment under TOD jurisdiction.
4. Continue coring support.
5. Investigate new equipment on the market and determine its common-user application.

Performance Indicators/Indicateurs de rendement

1. Updated inventory listing to be prepared by March 1, 1986.
2. To have all equipment processed through CADC by March 31, 1986.
3. Monitor maintenance program through meetings and reports (ongoing throughout fiscal year 1985/86).
4. (a) Meet all requests received for coring support.
   (b) Respond to all coring requests for technical advice and guidance.
5. Through reference to technical journals and manufacturers' catalogues, determine the state-of-the-art equipment having direct applications to NWRI research needs and replace or modify existing equipment accordingly.

Relevance/Objet

Ensure that equipment and instrumentation meets the requirements of NWRI research needs, as well as those of Pacific & Yukon/Western & Northern Regions and IWD - Ontario Region.

| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | Study Plan<br>Plan d'étude | | NO: 85-805 |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Support to External Agencies | | DIVISION TOD |
| KEY WORDS/ MOTS CLEFS | FIELD SUPPORT, EQUIPMENT, INSTRUMENTATION | | SECTION TODDIV<br>PAE EAP 1113 |
| STUDY LEADER/ CHEF D'ETUDE | Macdonald, H.B. | TEL: 637-4217 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | W.B. Taylor, P.M. Healey, J.A. Diaz | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1966 FINISH FIN Ongoing | | |
| PRIMARY USER/ USAGER PRIMAIRE | GLFRB/PFF | TEL: | OTHER USERS/ AUTRES USAGERS 6 |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

### Goal/But

1. To provide logistic support, equipment, instrumentation and field assistance as resources permit to agencies outside of NWRI.
2. To provide technical advice and guidance as requested.

### Performance Indicators/Indicateurs de rendement

1. To record and report on all support (both manpower and financial) provided to external agencies and provide the Director, NWRI, with a report of same at year-end or as requested.
2. To respond to all requests for technical advice and guidance in a timely fashion.

### Relevance/Objet

The efficient utilization of support resources at Burlington reduces the need for duplication and increased government spending on programs which are closely related to those agencies outside NWRI.

NATIONAL WATER RESEARCH INSTITUTE — Study Plan
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX — Plan d'étude

NO: 85-806

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Limnological/Meteorological Instrumentation Support | DIVISION<br>TOD |
| KEY WORDS/ MOTS CLEFS | MAINTENANCE, INSTRUMENTATION, EQUIPMENT, CALIBRATION, CURRENT METER, METEOROLOGY, LIMNOLOGY | SECTION<br>LIM/IN<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Diaz, J.A.<br>TEL: 637-4215 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J.A. Tyler, E.G. Smith | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1971<br>FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | NWRI Study Leaders<br>TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To continue ongoing programs of maintenance, calibration, modification and upgrading of self-recording current meters, digitizers, electro-bathythermograph units, shipboard transmissivity measuring systems, rosette water sampling systems, meteorological data acquisition systems, solar radiation recording systems, underwater acoustic systems and all ancillary equipment associated with the above system.
2. To provide expertise and field support in installation and servicing of electronic instrumentation at field sites, onboard major and minor research vessels, launches for NWRI, Regional and Outside Agencies.
3. To investigate state-of-the-art improvements that could optimize equipment performance and incorporate these improvements into existing equipment where applicable.

Performance Indicators/Indicateurs de rendement

1. To supply serviceable limnological instrumentation systems as and when requested for approved study programs within stated time frames.
2. To meet all requests for support to NWRI research and that of outside agencies, ensuring that data collected is complete and accurate.
3. Through reference to technical journals and manufacturers' catalogues, determine the state-of-the-art equipment having direct applications to NWRI research needs and replacing or modifying existing equipment.

Relevance/Objet

Immediate response to requests for equipment and service is possible due to the unique, multi-faceted support structure of TOD. The equipment covers a vast range of old and newly-developed, complex, highly sophisticated electronic instrumentation. The quality of usable data depends on the high degree of maintenance and calibration established. The scientific Study Leader is relieved of equipment logistics, maintenance and calibration.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-807

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Underwater Operations and Remote Areas Working Group | DIVISION TOD |
| KEY WORDS/ MOTS CLEFS | DIVING, FIELD SUPPORT, EQUIPMENT, TRAINING | SECTION FIELD<br>PAE EAP 1516 |
| STUDY LEADER/ CHEF D'ETUDE | Taylor, W.B. TEL: 637-4216 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | F.H. Don, J.A. Diaz, K.J. Hill, G.D. Bruce, C. Bisutti | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1970 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | DOE/DFO Study Leaders TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Co-ordinate the diving requirements for NWRI and all other agencies at CCIW, provide a training program, ensuring a high level of safety in all operations.
2. To provide diving equipment to meet operational requirements and conduct routine maintenance.
3. Represent DOE as Chairperson of the Departmental Diving Committee.
4. Continue co-ordination of a Remote Areas Working Group, to provide common-user equipment and procedures specific to the needs of studies being conducted in remote areas.

Performance Indicators/Indicateurs de rendement

1. Report in the Annual Activity Summary support given to NWRI and to other CCIW agencies, meeting all requests as resources permit in a timely fashion and conduct annual diving refresher courses.
2. Procure equipment for operational requirements, maintain records on equipment maintenance.
3. Conduct meetings and provide minutes of DOE Diving Committee.
4. Conduct 2 field operations in remote areas in support of NWRI research studies and assess equipment performance.

Relevance/Objet

Maintenance of a high level of diving expertise is vital to the success of many research studies where underwater work is conducted. Remote areas research requires the efficient use of existing resources and maximum safety of operations.

09/84

FORM A, PART 1/FORMULE A, PARTIE 1

# STAFF SERVICES DIVISION

## Staff Services Division

This Division provides central services to the National Water Research Institute and other tenant agencies at the Canada Centre for Inland Waters. Such services provide for:

(a) initiatives to improve management practices and controls;
(b) effective and efficient financial, administrative and materiel management services for NWRI and associated ECS agencies;
(c) simplified and, where possible, automated administrative practices to NWRI management, ensuring that these practices are uniform throughout the Institute and responsive to NWRI management and higher authority;
(d) cost-effective building, safety, security and industrial health services for all CCIW tenants;
(e) library services which respond to the changing needs of the CCIW research community;
(f) coordination of the program to take affirmative action for hiring of under-represented groups; and
(g) comprehensive and timely information service to respond to Access to Information legislation, to increase public awareness of the importance of all aspects of water resources research and to indicate the extent of DOE activities and their positive effect on the local economy.

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                  STUDIES FOR STAFF SERVICES DIVISION

SECTION     STUDY      STUDY TITLE                                                         STUDY LEADER     85/05/31.

DIVISION
             901       ADMINISTRATION                                                      SMITH,J.D.
             902       ADMINISTRATION (DSS)                                                FINDLAY,J.B.
             908       ADMINISTRATION (SAFETY,FIRE,SECURITY)                               JOVA,A.V.
             910       ADVISORY COMMITTEE ON UNDER-REPRESENTED GROUPS                      SUDAR,A.

MATERIAL MANAGEMENT
             904       ADMINISTRATION (MATERIEL MANAGEMENT)                                BURTON,D.A.

CENTRAL REGISTRY
             905       ADMINISTRATION (CENTRAL REGISTRY)                                   RAE,E.

FINANCE
             906       ADMINISTRATION (FINANCE)                                            JAGOE,J.A.

BUILDING AND PROPERTIES
             907       CCIW PHYSICAL PLANT                                                 STEWART,D.F.

LIBRARY SERVICES
             909       LIBRARY                                                             DOWIE,E.
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                                                                     DATE RUN  85/05/23.
PROCESSING FORMB FOR DIVISION SSD

   ----ORGANIZATION---- --ENGINEERING---- -----MANTEC------ ---TECH OPS.--- --DM-- ------EXTERNAL---- SHADOW ----------TOTALS----------
NO  PY SAL     OM   CAP  PY SAL  OM  CAP  PY SAL   OM  CAP  PY SAL   OM OT PY SAL AG PY SAL   OM  CAP COST   PY SAL    OM   CAP   COST

901 8.C 535  70.0   --   -- --   --   --  -- --    --   --  -- --    -- -- -- --     -- --    --   --   --  8.00 535  70.0   --   604.7

902  -- --    5.0   --   -- --   --   --  -- --    --   --  -- --    -- -- -- --     -- --    --   --   --    --  --   5.0   --     5.0

904 7.0 123  62.4  5.0   -- --   --   --  -- --    --   --  -- --    -- -- .15 5     -- --    --   --   --  7.15 125  62.4  5.0   192.8

905 3.0  44  70.0   --   -- --   --   --  -- --    --   --  -- --    -- -- -- --     -- --    --   --   --  3.00  44  70.0   --   114.0

906 7.0 144 210.0   --   -- --   --   --  -- --    --   --  -- --    -- -- -- --     -- --    --   --   --  7.00 144 210.0   --   354.2

90713.0 3122100.C  5.C   -- --   --   --  -- --    --   --  -- --    -- -- -- --     -- --    --   --   -- 13.00 3122100.0  5.0 2417.0

908 1.0  27    --   --   -- --   --   --  -- --    --   --  -- --    -- -- .02 1     -- --    --   --   --  1.02  28    --   --    28.1

909 5.0 106 190.0  5.0   -- --   --   --  -- --    --   --  -- --    -- -- .03 1     -- --    --   --   --  5.C3 1C7 190.0  5.0   302.4

910  -- --    1.6   --   -- --   --   --  -- --    --   --  -- --    -- -- -- --     -- --    --   --   --    --  --   1.6   --     1.6

   44.00  2709.0       --      --     --      --      --     --  .20      --     --       --     1296         15.0
       1259        15.0    --      --     --      --      --     --    7       --      --    44.20   2709.0        4019.7
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NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-901

| | | |
|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Administration | DIVISION SSD |
| KEY WORDS/ MOTS CLEFS | PLAN, MANAGEMENT | SECTION SSDDIV<br>PAE EAP 1631 |
| STUDY LEADER/ CHEF D'ETUDE | Smith, J.D. TEL: 637-4656 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | E. Jones, F. Boyd, C.D. Leacock, C. Kennedy<br>A.Mitchell, H. Zrostek, D. Burford (Term) | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1981 FINISH FIN Ongoing | NWRI |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Prepare handbook which provides new employees with necessary information on all aspects of the CCIW work environment.
2. Ensure that CCIW capabilities to respond to external emergencies are fully integrated with Emergency Measures Plans of local municipalities.
3. Devise audit models to facilitate internal audit of all NWRI support operations.
4. Introduce management process to incorporate line management responsibilities for NWRI W&N and P&Y Detachments.
5. Respond to all enquiries received under the Access to Information Act.
6. Take action to enhance the position of NWRI/CCIW within the local community ensuring that citizens and local government officials are cognizant of the Centre's mandate and its positive effect on the local economy.
7. Improve the standard of services available to the public in both official languages.
8. Provide a word-processing Shared Resource Centre for the NWRI.

Performance Indicators/Indicateurs de rendement)

1) a) Compile information in first draft form by 1 December 1985.
   b) Complete final Handbook by 31 March 1986.
2) a) Prepare a document for the Director, NWRI, outlining CCIW capabilities to respond to external emergencies of local municipalities.
   b) Hold semi-annual meetings with Emergency Measures Groups of the local municipalities to ensure CCIW capabilities respond to Municipalities' Plans.
3) Internal audit models to be operational by year-end in areas pertaining to finance, materiel management and vehicle fleet operation.
4. Line management responsibilities for P&Y and W&N Detachments located at Saskatoon to be incorporated into NWRI management process by 31 March 1986.
5) Action all enquiries received under the Access to Information Act within the prescribed time limit.
6) a) CCIW Open House '85 to be held 18-21 April, 1985.
   b) Arrange school and public interest group tours of the CCIW complex upon request.
7) In the areas of signage, publications and information requests, provide service to the public in both official languages.
8) Review the existing guidelines and enhance service to the Institute where possible within available resources.

Relevance/Objet

To provide administrative services to the Director, NWRI, to the Director IWD-OR, to the Chief, NWQL, and to the DG, DFO, in support of the research mandates of the CCIW.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-902

| | | | |
|---|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Administration (DSS) | | DIVISION SSD |
| KEY WORDS/ MOTS CLEFS | PROCUREMENT, CONTRACTS | | SECTION SSDDIV<br>PAE EAP 1631 |
| STUDY LEADER/ CHEF D'ETUDE | Findlay, J.B. | TEL: 637-4300 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE<br>NWRI |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J. Ceolin | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1981 | FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To provide low dollar value purchasing services for all government departments located at CCIW, ensuring that they are carried out in a cost-effective manner in accordance with the Government of Canada Supply and Services Act.

Performance Indicators/Indicateurs de rendement

Optimum service in a timely fashion to all CCIW agencies on a day-to-day basis.

Relevance/Objet

To ensure optimum service to the Department in all matters relating to purchasing.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

| | | |
|---|---|---|
| | | NO: 85-904 |
| STUDY TITLE/ TITRE D'ETUDE | Administration (Materiel Management) | DIVISION SSD |
| | | SECTION MATRL |
| KEY WORDS/ MOTS CLEFS | MATERIEL MANAGEMENT, PROCUREMENT, STORES, EQUIPMENT | PAE EAP 1631 |
| STUDY LEADER/ CHEF D'ETUDE | Burton, D.A. TEL: 637-4391 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | S.E. Hicks, J. Mellon, M. Eadie, W. Coventry, M. Ross | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1981 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To provide, on a continuing basis, the full scope of materiel management services, i.e., procurement, inventory control and assets management, disposal, warehousing, central stores operation for clothing and chemicals, shipping and receiving. Services to be provided in a manner which will ensure optimum usage and benefits of all materiel resources available in CCIW for all units supported by this Section (NWRI, IWD/OR, EPS, WQNL and DFO).
2. Introduce an automated procurement system designed to speed up and provide more effective control of the procurement process, significantly reducing the associated paperwork.
3. Implement a life-cycle management system for the replacement of capital equipment and the maintenance of fixed assets.
4. Design and implement a computerized chargeback system for chemical wastes and departmental forms.
5. Upon completion of the furniture inventory, develop a computerized system whereby semi-annual reports will be sent to NWRI Managers to advise them of their holdings, thereby increasing accountability.

Performance Indicators/Indicateurs de rendement

1. Optimum services to be provided on a daily basis.
2. (a) Introduce the system at the Procurement Desk by 1 May 1985.
   (b) Implement the system on a trial basis in one Division by 1 July 1985.
   (c) Implement the system throughout NWRI by 31 March 1986.
3. System should be implemented and its effect noted in Inventory Management by not later than 31 March 1986.
4. Implement the new chargeback system by 1 September 1985.
5. Complete this task by 1 January 1986.

Relevance/Objet

To provide Materiel Management services to the Director, NWRI, to the Director IWD-OR, to the Chief, WQNL, and to the DG-DFO, in support of the research mandate of ECS agencies at the CCIW.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85- 905

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Administration (Central Registry) | DIVISION SSD |
| | | SECTION CR |
| KEY WORDS/ MOTS CLEFS | RECORDS MANAGEMENT, INFORMATION-PUBLIC | PAE EAP 1631 |
| STUDY LEADER/ CHEF D'ETUDE | Rae, E. TEL: 637-4275 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | M. Solvason (Part-Time), J. Sims (Part-Time) | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1981 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To provide management of records, mail services, telex and telecopy services, and maintain duplicating facilities for departments located at CCIW. Services to be provided in an efficient, cost-effective manner to ensure that scientific programs are not impeded by administrative delays.
2. Review Central Registry procedures and automate, where possible, all routine clerical functions.
3. Continue to review filing equipment facilities and space requirements for records to ensure record retrieval services are provided in an efficient and cost-effective manner.
4. Maintain accurate records on cost of Central Registry services provided to other Government departments and other DOE/ECS agencies in CCIW.
5. Answer general enquiries received by telephone, mail or in person, from the public, the media or other government offices by providing information requested or referring enquiries to the appropriate source of information.
6. Gather Divisional news items, edit and prepare for printing and distribute the NWRI Internal Waves publication.
7. In conjunction with the Burlington Association for the Mentally Handicapped employ two mentally handicapped persons in a manner which will enhance their sense of self-worth and who will provide a useful mail delivery service within CCIW.

Performance Indicators/Indicateurs de rendement

1. Provide optimum and timely services on a daily basis.
2. To conduct a feasibility review of the development of an automated central records system.
3. Complete review and implement change where required on a continuing basis.
4. Maintain records and report findings to Chief, SSD, for chargebacks on a monthly basis.
5. On a daily basis, respond courteously, accurately and in a timely fashion to all requests for information received.
6. On a quarterly basis, edit and distribute the Internal Waves publication.
7. Provide an internal mail delivery and pick-up service to NWRI, benefitting staff in the Divisions as well as the self-esteem of the mentally handicapped who will provide this service.

Relevance/Objet

To provide registry services to the Director, NWRI, to the Director IWD-OR, to the Chief, WQNL, and to the DG-DFO, in support of the research mandate of all agencies at

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| NATIONAL WATER RESEARCH INSTITUTE<br>L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX | Study Plan<br>Plan d'étude | NO: 85-906 |
| STUDY TITLE/ TITRE D'ETUDE | Administration (Finance) | DIVISION SSD |
| KEY WORDS/ MOTS CLEFS | BUDGETS, CAPITAL, FINANCE, REPORTS | SECTION FINS<br>PAE EAP 1630 |
| STUDY LEADER/ CHEF D'ETUDE | Jagoe, J.A. TEL: 637-4681 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | Y. Hutton, B. Titley, E. Wendel, R. Haswell, D. Jefferson | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1981 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | N/A TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Provide financial accounting and reporting services to all ECS units located at CCIW by maintaining records of allocations, expenditures and commitments, processing all accounts payable and receivable, travel, relocations and miscellaneous claims, receiving and issuing Receiver General pay cheques, maintaining a petty cash fund and making deposits to the Receiver General Transfer Account.
2. Continue the review to improve accounts payable and procurement procedures and automate, where possible, all routine clerical functions.
3. Provide cross-training of Accounts Clerks to ensure back-up and to lead to generic job description..
4. Meet H.Q. deadlines for all reports and returns.
5. Provide pay administration for all ECS units located at CCIW and in WSC-Guelph.
6. Review and collate Division estimates and prepare NWRI Main Estimates submission.
7. To improve liaison between the finance office and line managers.

Performance Indicators/Indicateurs de rendement

1. Meet day-to-day requirements for IWD-Ontario, Water Quality National Laboratory and NWRI together with GLWQP funding from RDG-Ontario and other external funding..
2. Automate to the WANG system where applicable.
3. Implement training plan based on a generic job description for all accounts clerks to be completed by September 1986.
4. Meet all deadlines as required.
5. Ongoing requirement.
6. Main Estimates to be submitted to IWD/HQ 25 August, 1985.
7. Confidence in AFMAS and DSS reports with elimination of Division manual accounting systems by FY end.

Relevance/Objet

To provide financial services to the Director, NWRI, in support of the research mandates of ECS agencies at CCIW.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85-907

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | CCIW Physical Plant | DIVISION SSD |
| KEY WORDS/ MOTS CLEFS | PLANT, MAINTENANCE, CONTRACTS | SECTION B/PROS<br>PAE EAP 1650 |
| STUDY LEADER/ CHEF D'ETUDE | Stewart, D.F. TEL: 637-4500 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | J.C.Stewart, R.J. McCurdy, K.Taylor, A.K.Allaby, J.P.Denomme, S.Wynne, W.A.Johnson, T.Comiskey, F.Adams, G.Johnstone, A. Cruz | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1966 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Maintain CCIW buildings and plant and progress the orderly development of the Centre, as necessary, to sustain CCIW research program.
2. Maintain a CCIW development and maintenance plan for buildings and their integral equipment, which includes maintenance and construction costs and associated life-cycle, cost-analysis data.
3. Review all B&PS clerical procedures and automate where possible.
4. Maintain a record of CCIW space allocations.
5. Progress energy conservation endeavours.
6. Install new state-of-the-art telecommunications system and integrate this equipment with the Office Information System.

Performance Indicators/Indicateurs de rendement

1. Provide optimum service for daily requirements.
2. Pertinent data to be included in plan as maintenance and construction costs occur.
3. Review of clerical procedures is ongoing. Automation will take place as and when required.
4. Ongoing.
5. Progress all B&P work with a view to energy conservation. On receipt of Consultant's Report from Facilities Management Branch, implement energy conservation recommendations as agreed.
6. New system to be in place by 1 August 1985.

Relevance/Objet

Provision of building and property services to the Director, NWRI, the Director IWD-OR, to the Chief, WQNL, and the Director General, DFO, in support of the research mandates of CCIW.

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Administration (Safety, Fire, Security) | NO: 85-908 |
| | | DIVISION SSD |
| KEY WORDS/ MOTS CLEFS | Administration, Plan, Maintenance, Training | SECTION SSDDIV |
| | | PAE EAP 1631 |
| STUDY LEADER/ CHEF D'ETUDE | Jova, A.V. TEL: 637-4503 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. Coordinate, implement and audit a fire, security and occupational health and safety program for the CCIW, i.e. inspections, coordination of staff, training, consultation to unit safety committees, managers and individuals, emergency response, control of government identification cards and access to CCIW.

2. a) Devise and implement a student employee induction program for safety and security.
   b) Expand this program to include all new and existing employees.

3. Coordinate data for all CCIW staff with regard to first-aid, CPR, defensive driving and laboratory safety training. Computerize this data together with identification card data.

Performance Indicators/Indicateurs de rendement

1. These services to be provided on a day-to-day basis in a timely fashion.

2. a) To be in place by 1 May 1985.
   b) To be in place by 1 September 1985.

3. To be in operation 1 June 1985.

Relevance/Objet

To provide a fire, security and occupational health and safety program to the Director, NWRI, and other tenant agencies at the Canada Centre for Inland Waters.

NATIONAL WATER RESEARCH INSTITUTE
L'INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Study Plan
Plan d'étude

NO: 85-909

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Library | DIVISION SSD |
| KEY WORDS/ MOTS CLEFS | LIBRARY, PLAN | SECTION LIBRAS<br>PAE EAP 1660 |
| STUDY LEADER/ CHEF D'ETUDE | Dowie, E. TEL: 637-4530 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | P. Haley, P. Bennett, K. Finch, J. Tinney | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN Ongoing | |
| PRIMARY USER/ USAGER PRIMAIRE | CCIW Scientific, Professional and Technical Community TEL: | OTHER USERS/ AUTRES USAGERS 200 |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To ensure that the Library continues to respond to the changing needs of the research community, within the constraints of limited financial and PY resources.
2. Organize and analyze documents in the library collection to facilitate access by meeting the Library's cataloguing priorities for new publications, given staffing constraints.
3. Acquire library materials through purchase, donations, and inter-library loan.
4. Provide reference, loan and inter-library loan service as required.
5. Continue initiatives, where possible, toward a comprehensive collection development policy.
6. Subject to available funding, implement Phase 1 of the DOBIS automated library system, with the first priority being given to the cataloguing functions.

Performance Indicators/Indicateurs de rendement

1. Provide optimum services in a timely fashion on a daily basis, where possible.
2. Catalogue urgent items as received, with second priority given to items suggested by or written by CCIW staff and third priority to library purchases (with primary priority given to reference books).
3. Inter-library loans to be searched, verified and processed within 24 to 48 hours. Requests for library purchase are to be searched, verified and processed as funds and staff permit. All donations are to be recorded in unprocessed give file within 48 hours of receipt.
4. Answer 80% of all reference questions within 24 hours and 20% within 2 to 4 days. Loan requests from outside libraries to be processed within 24 to 48 hours. Conduct on-line searches within 48 to 72 hours and provide daily circulation service and maintain a continuous presence of library staff at circulation/reference desk.
5. Acquire and review relevant documents from the 1984/85 collection development bibliographic survey.
6. Subject to funding, equipment operational by September 1985; training of library staff completed by April 1985; and provide CCIW staff the first DOBIS products by April 1986.

Relevance/Objet

To provide library services to CCIW Scientific staff in support of the research mandate of CCIW.

09/84

FORM A, PART 1/FORMULE A, PARTIE 1

NATIONAL WATER RESEARCH INSTITUTE
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Study Plan
Plan d'étude

NO: 85-910

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|---|---|---|
| STUDY TITLE/ TITRE D'ETUDE | Advisory Committee on Under-Represented Groups | DIVISION SSD |
| KEY WORDS/ MOTS CLEFS | AFFIRMATIVE ACTION, UNDER-REPRESENTED GROUPS | SECTION SSDDIV<br>PAE EAP 1631 |
| STUDY LEADER/ CHEF D'ETUDE | Sudar, A. TEL: 637-4321 | SUPPLEMENTAL RESOURCES/ FINANCEMENT SUPPLEMENTAIRE |
| TEAM MEMBERS/ MEMBRES D'EQUIPE | S. Painter, C. Bishop, M. Kinder, K.L. Taylor | |
| TIME FRAME/ CALENDRIER | START DEBUT April 1985 FINISH FIN March 1986 | |
| PRIMARY USER/ USAGER PRIMAIRE | TEL: | OTHER USERS/ AUTRES USAGERS |
| IWD/DGEI CONTACT | TEL: | INTEREST/INTERET DIRECT-GENERAL |

Goal/But

1. To advise management on issues pertinent to under-represented groups at the CCIW as time and personnel cooperation permit.

Performance Indicators/Indicateurs de rendement

1. a) Continue implementation of office automation as an ongoing project.

   b) Report to onsite DOE Directors on activities by year-end.

Relevance/Object

To act on Affirmative Action goals established by the Director General, IWD, as they pertain to Environment Canada staff at CCIW.

09/84

FORM A, PART 1/FORMULE A, PARTIE 1